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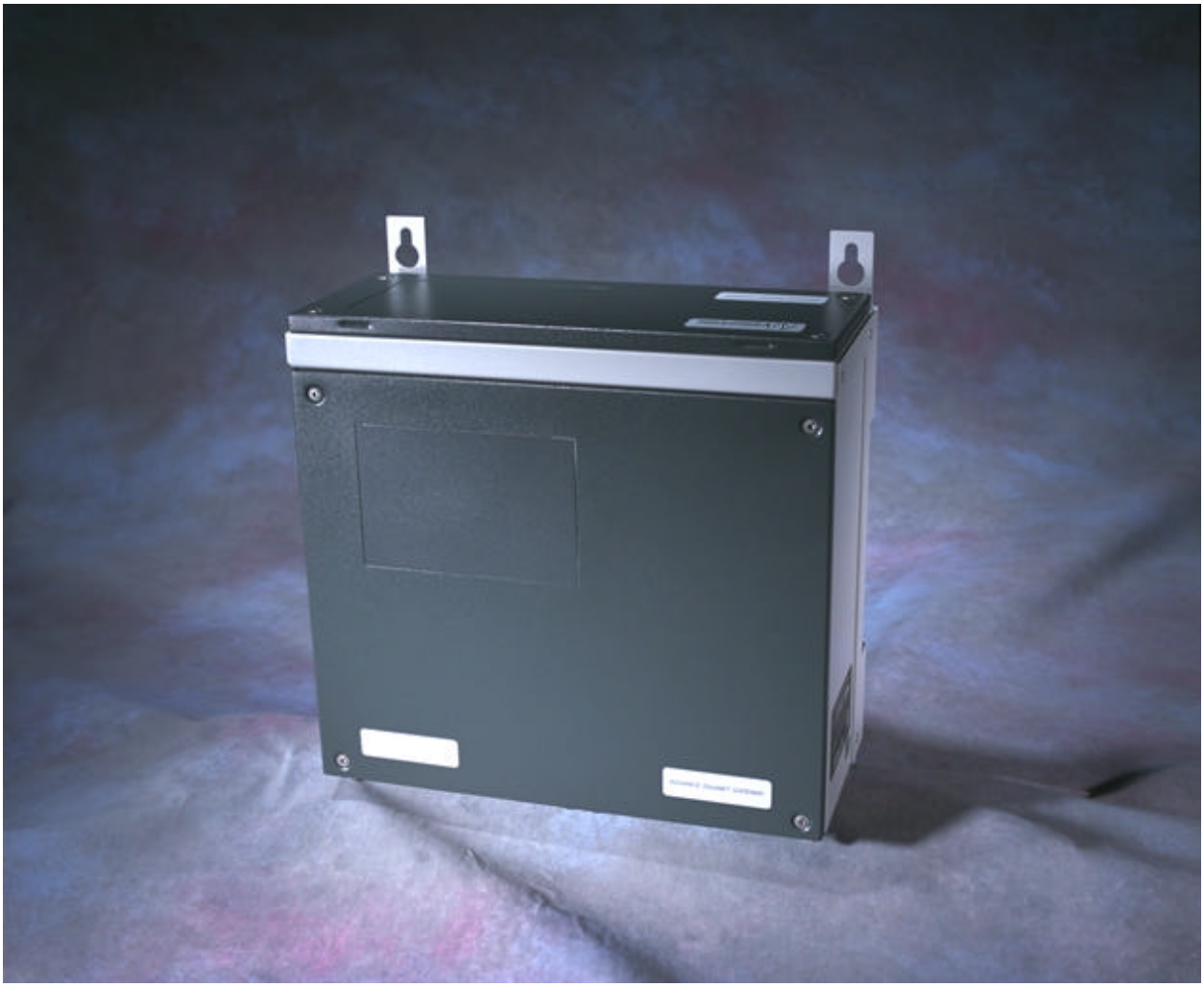
Siemens Applied Automation

Advance Network Gateway with DataNET (ANG_DN)



February 2002

User's Manual
2000591-001

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Preface

Audience & Purpose

This manual is intended to introduce users to the Advance Network Gateway unit with the DataNET (ANG_DN) option. It includes instructions for safe and proper installation of the ANG_DN) by installation personnel.

Chapter Contents

The manual provides the following information:

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Technical Support

Getting Help

At Siemens Applied Automation we take pride in the on going support we provide our customers. When you purchase a product, you receive a detailed manual, which should answer your questions; however, our technical support service provides a special “hot” line as an added source of information.

If you require assistance call:

Inside Oklahoma: (918) 662-7430
Outside Oklahoma: (800) 448-8224
Internationally: 001-918-662-7430

Before You Call

Before you call one of our technical support lines. Please have the following information available to help our representative answer your questions:

1. Unit Serial Number and Date of Installation
2. Description of problem
3. LEDs status on Communication Boards

Safety Practices and Precautions

Safety First

This product has been designed and tested in accordance with IEC Publication 1010-1, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This manual contains information and warnings, which have to be followed by the user to ensure safe operation and to retain the product in a safe condition.

Terms in This Manual

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

Terms as Marked on Equipment

DANGER indicates a personal injury hazard immediately accessible as one reads the markings.

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.

Symbols in This Manual

This symbol indicates where applicable cautionary or other information is to be found.

Symbols Marked on Equipment

DANGER - High voltage

Protective ground (earth) terminal

ATTENTION - Refer to Manual

Grounding the Product

A grounding conductor should be connected to the grounding terminal before any other connections are made.

Correct Operating Voltage

Before switching on the power, check that the operating voltage listed on the equipment nameplate agrees with the available line voltage.

DANGER Arising from Loss of Ground

Any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.

Safe Equipment

If it is determined that the equipment cannot be operated safely, it should be taken out of operation and secured against unintentional usage.

Use the Proper Fuse

To avoid fire hazard, use only a fuse of the correct type, voltage rating and current rating as specified in the parts list for your product. Use of repaired fuses or short-circuiting of the fuse switch is not permitted.

Safety Guidelines

DO NOT open the equipment to perform any adjustments, measurements, maintenance, parts replacement or repairs until all power supplies have been disconnected.

Only a properly trained technician should work on any equipment with power still applied.

When opening covers or removing parts, exercise extreme care since "live parts or connections can be exposed".

Capacitors in the equipment can retain their charge even after the unit has been disconnected from all power supplies.

Chapter 1

Introduction

Overview

Description

The Advance Network Gateway unit with the DataNET (ANG_DN) option connects equipment residing on an Advance Data Hiway to the Advance Communication System (ACS) via a DataNET link. The unit functions as a translator for converting signals and communication protocols. This conversion allows Advance Maxum GC's and Advance GC's to communicate with each other in addition to using each other's Distributed Control System (DCS) I/O links.

The DataNET link can use either copper and/or fiber optic cables. In an existing Data Hiway installation the Data Hiway cable can be used.

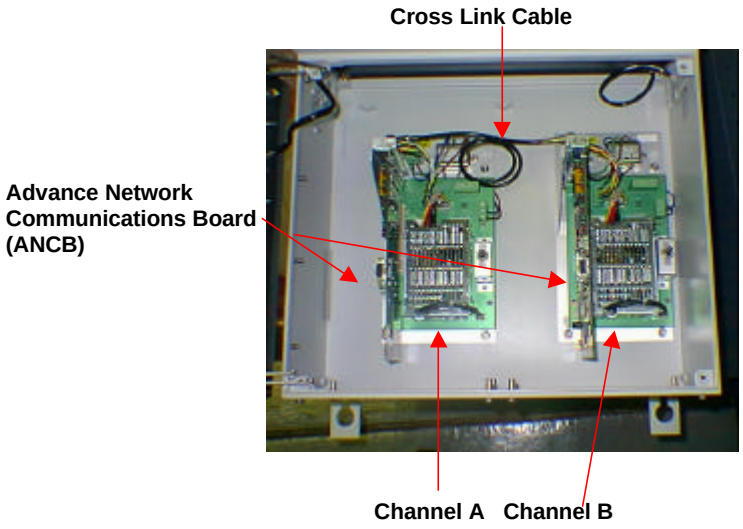
What is DataNET

DataNET is a Siemens Applied Automation communications protocol that can be used in place of Ethernet for connecting all installed Maxum and Advance GC's. As compared to Ethernet, DataNET provides a higher speed network and minimizes installation of new field wiring.

Redundancy

The Advance Network DataNET Gateway is fully redundant with two Advance Network Communications Boards (ANCB) and power supplies. Each ANCB provides either a channel A or channel B network interface for one Data Hiway channel and one DataNET channel.

An internal Ethernet cross-link connection via the Ethernet 10Base2 (BNC) port provides the communication link between the two advance network communications boards (ANCB).



Available Configurations

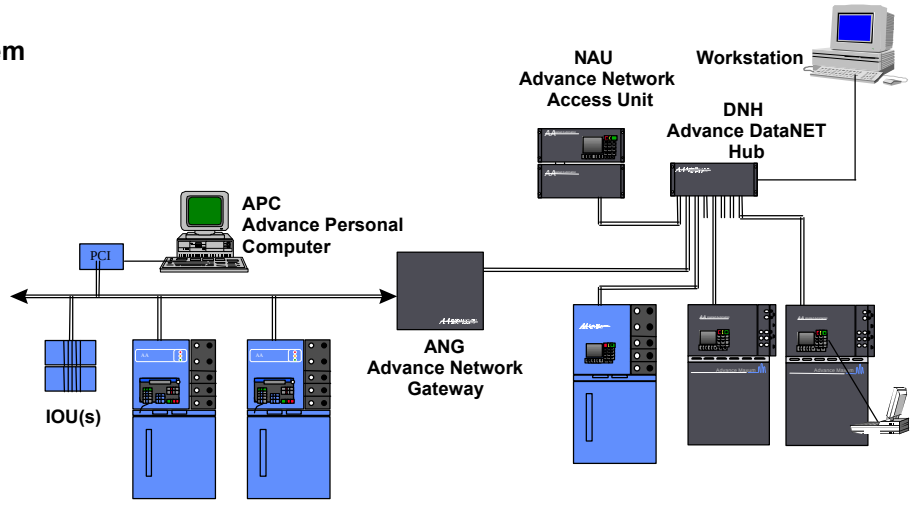
The Advance Network DataNET Gateway is available in the following optional configurations:

Description	SAA Part Number
CSA/NRTL, Div 2, ADH to DataNET, Wall Mount, CE (Copper)	2015841-001
CSA/NRTL, Div 2, ADH to DataNET, Wall Mount, CE (Fiber Optic)	2015841-002
CSA/NRTL, Div 2, ADH to DataNET, Rack Mount, CE (Copper)	2015839-001
CSA/NRTL, Div 2, ADH to DataNET, Rack Mount, CE (Fiber Optic)	2015839-002
CENELEC, ZONE 1, ADH to DataNET, Wall Mount, CE (Copper)	2015852-001
CENELEC, ZONE 1, ADH to DataNET, Wall Mount, CE (Fiber Optics)	2015852-002

Advance Communications System

The Advance Communication System (ACS) is a high-speed communications system that uses TCP protocols and IP addressing to interconnect chromatographs and other process analyzers in a common network. Figure 1-1 shows the Advance DataNET Hub (DNH), Advance Network Access Unit (NAU) and Advance Network Gateway (ANG) connected to the ACS. The NAU connects to the ACS and provides a method to access information coming from Advance process analyzers including Advance Maxum and Advance Optichrom GC's. The ANG is used to connect Siemens Applied Automation's equipment residing on an Advance Data Hiway to the ACS.

Figure 1-1. Advance Communication System (ACS)



Advance Optichrom GC's

Advance Optichrom Service Panels and older APC workstations can display Advance Maxum GC information over the Gateway link. They are, however, limited to only accessing and changing basic operational status. This data includes alarms, run/hold/calibrate, view, analysis results etc.

Important

The Advance DataNET Hub (DNH) unit must have a software version greater than 2.11 when interfacing with an Advance Network Gateway DataNET unit. To update the DNH software please call Siemens AAI technical support:

Inside Oklahoma: (918) 662-7430
Outside Oklahoma: (800) 448-8224
Internationally: 001-918-662-7430

ANG_DN Specifications

Dimensions	Rack Mounted Package Configuration See Figure 1-2 for Outline Drawing and Dimensions Wall-Mounted Package Configuration See Figure 1-3 for Outline Drawing and Dimensions Zone 1 - Wall-Mounted Package Configuration See Figure 1-4 for Outline Drawing and Dimension
Housing, Explosion Protection, Ratings and Certifications	Wall Mounted Configuration NEMA 3 (IP-54) CSA Certified for Class I, Division 2, Group A,B,C,D CENELEC non-Ex (Air purge is not required for fire protection as indicated; however, the unit may be air purged, if desired, for additional protection from environmental elements.) Rack Mounted Configuration NEMA 2 (IP-20) CSA Certified for Class I, Division 2, Group A,B,C,D CENELEC non-Ex Zone 1 Configurations CENELEC approved EEx d IIC T6 Cortem CCA-04 enclosure Electromagnetic and Radio Frequency Compatibility and Electrical Safety CE Compliance; certified to 89/336/ECC (EMC directive) CE Compliance; certified to 73/23/EEC (Low Voltage directive) Tested per EN 61010-1 / IEC 1010-1 Housing Materials and Colors Stainless steel (1.4016); Front and top are commercial gray B (RAL 7043), housing is light gray (RAL 7035) Weight Rack/Wall: 15 kg (35 pounds) approximately Zone 1: 33 kg (73 pounds)
Electronics	The electronics are certified for use in NEC Division 2 and IEC (Cenelec) Zone 2 hazardous locations.

ANG_DN Specifications, Continued

Ambient Installation Conditions	Operation: -18° to +50°C (0° to 122°F) 0-99% relative humidity (non-condensing) maximum 0-75% relative humidity year-round average (Purge with dry air or nitrogen if required in tropical conditions.) Must not be exposed to direct sunlight. Must be protected from rain. Storage and Transport: -25° to +65°C
Power	Nominal: 115 Vac / 230 Vac (universal input) Tolerance: 85-140 Vac or 185-250 Vac; 47-63 Hz 300 watts Power line protection: G fuse element per IEC 127-2, 4 A rating, slow-blow Power wiring in field made to screw terminals on two part connectors; 16 AWG (1.5 mm) or smaller power wiring is accepted; must conform to local installation codes and requirements. If conformance to CE certified installation requirements is required, power cable must be shielded or installed in conduit.
Dual Communication Modules	Redundant system consisting of two identical modules. Each module consists of universal power supply and Advance Communications Board (ANCB).
Protocol and Addressing	Open Systems standard TCP/IP protocol and addressing (Transmission Control Protocol/Internet Protocol); Full Class A, B and C addresses and subnet masking supported
Wiring Connections	• Two part connectors with screw-terminals provided for AC power connection • Two part connectors with screw-terminals provided for cable connection • Fiber Optic Coupler for Fiber Optic Connections

DataNET Option, Standard Cable	• Cable connection by Belden 9182 (single pair) or Belden SSD1743 (two pairs) or equivalent; two pairs of wires are required to support redundancy • Shielded cable or unshielded cable in conduit is required for conformance to CE certified installation • Two part connectors with screw-terminals provided for field connection
DataNET Option, Fiber Optic Cable	• Fiber optics connection by 62.5 multi-mode cable corresponding to 10BaseFL Ethernet specification • Two pairs of fibers are required to support redundancy • Type ST mating connectors provided for field connection • Approximately 3 mbps base transmission rate; uses dedicated transmission technique that does not require collision detection to achieve high data throughput efficiency • Maximum Length 5000 feet (1.7km)
Fiber Optic Coupler	• Two (Tx, Rx) ST-Style Connectors (Amp type 2.5mm Bayonet)
Ethernet Option	• The ANG DataNET unit does not support Ethernert.
Serial Port	• Standard RS-232 port for attachment of a laptop computer used for configuration and diagnostic purposes.

Communication Comparisons

The Table below compares key communication features between using Advance Data Hiway, Ethernet, or DataNET.

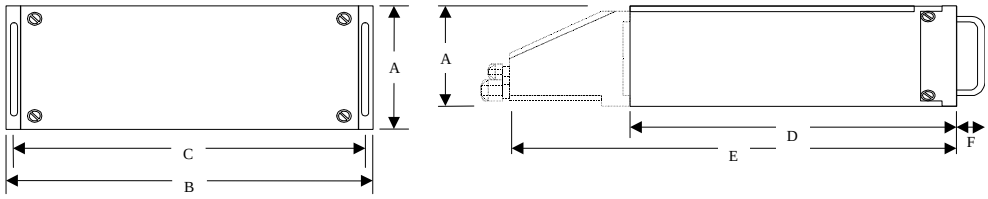
Feature	Advance Data Hiway	Ethernet	DataNET
Speed	14.2 KB/Sec	10 M baud	2. 048 M baud
Redundant	Yes	No	Yes
Number of Units in Maxum System	248	1200	1200

ANG Cable Types

The following Table should be used when evaluating or selecting cable for an existing or new installation.

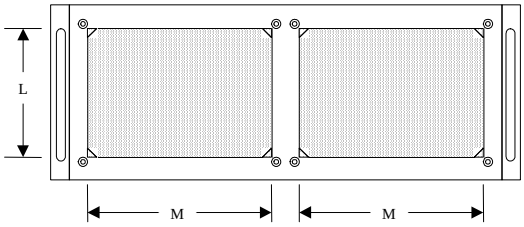
Cable Type	Vendors & P/N	Installation Notes
Fiber Optic MM 62.5/125; 4 Fiber Conductors Required for TX/RX Redundancy	SAA P/N 1270002-002 Industry Available from Multiple Vendors	New Installation as an alternative to copper cable Max distance from Analyzer to Hub or between Hubs 1520 meters (5000 ft)
2- Conductor Copper Wire	SAA P/N 1686002-001 Belden P/N 9182 For Belden Armored Cable Order SAA P/N 1680000-002	Recommended for Single Channel Max distance from Analyzer to Hub or between Hubs 1520 meters (5000 ft)
4-Conductor Copper Wire	SAA P/N 1681000-003 Belden P/N SSD1743	Recommended for Dual Channel Max distance from Analyzer to Hub or between Hubs 1520 meters (5000 ft)
Ethernet Cat 5 STP Shielded Twisted pair or Cat. 5 UTP in Conduit	SAA P/N 1681003-006 Industry Available from Multiple Vendors	Recommended for short distances or within shelters. Max distance from analyzer to hub or between hubs 600 meters (2000 ft)

Figure 1-2. Rack Mount Dimensions



Rack Mount, Front View

Rack Mount, Side View

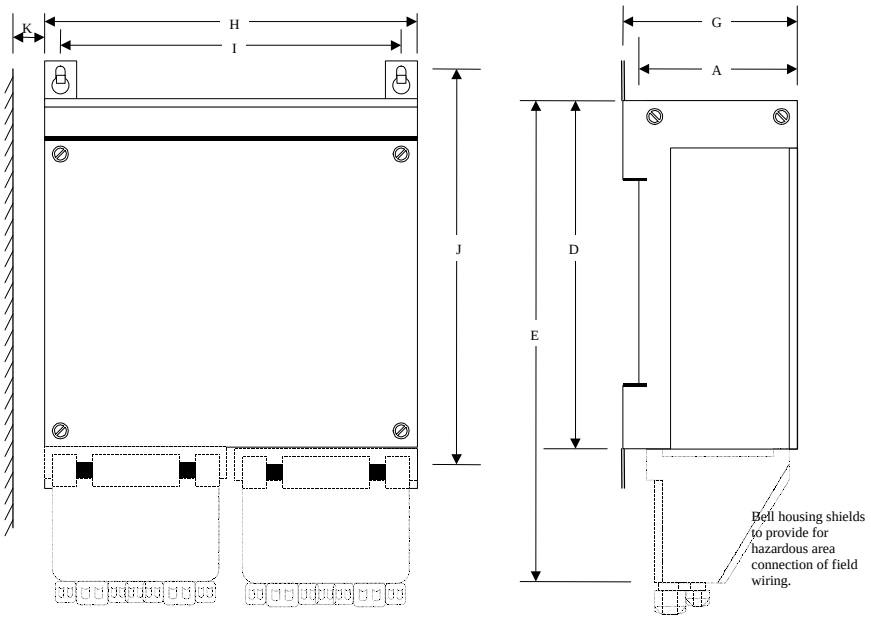


Rack Mount, Rear View

Dimension Table

Figure 1-2	Description	U.S. Inches	Metric mm
A	Rack Height	6 15/16	177
B	Rack Total Width	19	483
C	Rack Mounting Holes Spacing	18 1/4	464
D	Rack Depth of Case Only	16 1/4	413
E	Rack Depth Including Cable Housing	22 1/8	563
F	Handle Depth in Front of Rack	1 3/8	35
L	Height of Rear Access Panels	5	127
M	Width of Rear Access Panels	7 ½	190

Figure 1-3. Wall Mount Dimensions



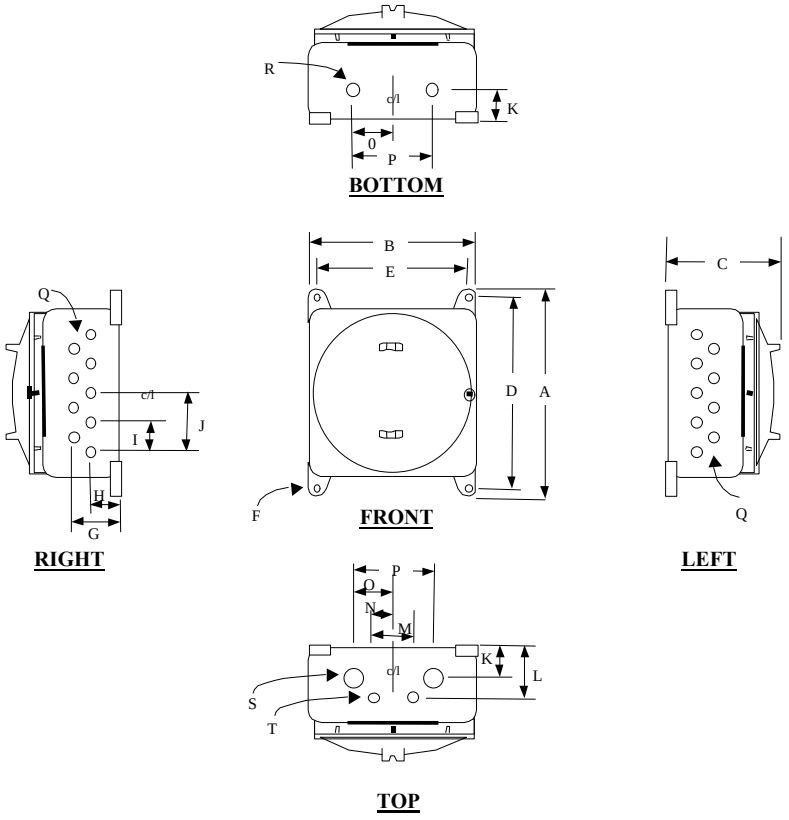
Wall Mount, Front View

Wall Mount, Left Side View

Dimension Table

Figure 1-3	Description	U.S. Inches	Metric mm
G	Wall Depth	7 13/16	199
H	Wall Width	17 1/2	444
I	Wall Mount Holes Horizontal Spacing	15 9/16	396
D	Wall Height of Case Only	16 1/4	413
E	Wall Height Including Cable Housing	22 1/8	563
J	Wall Mount Holes Vertical Spacing	17 11/16	450
K	Left Side Wall Clearance for Door Opening	2 3/8	60

Figure 1-4. Zone 1 – Wall Mount



Dimension Table

Figure 1-4	Description	Metric (mm)	U.S. (inches)
A	Overall enclosure height	523	20 9/16
B	Overall enclosure width	431	16 15/16
C	Overall enclosure depth from wall mounting	271	10 11/16
D	Vertical distance between wall mounting holes	481	19
E	Horizontal distance between wall mounting holes	390	15 3/8
F	Clearance of wall mounting holes	20	13/16
G	Distance from wall to front cable entry hole (left and right)	120	4 3/4
H	Distance from wall to back cable entry hole (left and right)	76	3
I	Spacing between holes on sides (left and right)	76	3
J	Spacing from center line to outer hole on side (left and right)	153	6
K	Spacing from wall to back cable entry hole (top and bottom)	76	3

Figure 1-4. Zone 1 – Wall Mount Dimension Table, continued

Figure 1-4	Description	Metric (mm)	U.S. (inches)
L	Spacing from wall to front cable entry hole (top and bottom)	127	5
M	Spacing between front cable entry holes (top)	102	4
N	Spacing between center line and outer cable entry hole (top)	102	4
O	Spacing between center line and outer cable entry hole (top and bottom)	51	2
P	Spacing between rear cable entry holes (top and bottom)	102	4
Q	9 threaded cable entry holes each on left and right sides	M25 x 1.5	
R	2 threaded cable entry holes on bottom	M25 x 1.5	
S	2 threaded cable entry holes on top		1-1/4 x 11 NPT
T	2 threaded cable entry holes on top		3/4 x 14 NPT

Chapter 2

Installation

Overview

Introduction

This chapter is intended for installation personnel. After completing the procedures in this chapter the Advance Network Gateway (ANG) will be ready for operation. To ensure a safe and trouble free installation, follow all procedures and associated advisory information.

WARNING
⚠

Ensure that all AC Power (Mains) Specification requirements and advisories are met. Failure to do so, and operating the equipment in a manner not specified, may impair the safety protection provided by the equipment.

Installation Overview

Before beginning the installation process read through this Chapter to familiarize yourself with the installations requirements. This will aid you to ensure a safe and trouble free installation.

Topic	See Page
Unpacking and Inspection	14
Pre Installation Planning	15
Wall or Rack Mounting Installation	16
Site Wiring Requirements	18
CE Installations	22
Wiring Connections	24
AC Power (Mains) Connections	25
Data Hiway Connections	28
DataNET Connections	31
DataNET Copper Connections	32
DataNET Fiber Optic Connections	34

Unpacking and Inspection

Description

This section provides the steps to follow when receiving and unpacking the Advance Network Gateway (ANG).

Shipping Damage

When the unit is received, examine the shipping container for evidence of external damage. Record any external damage.

Unpacking

Open the carton containing the ANG and remove all packing material. Carefully remove the unit from the carton and inspect it for damage that may have occurred during transportation. Carefully examine shipped contents with those listed on the packing slip. All items should match those on packing slip.

Perform the following inspections:

- Inspect ANG exterior for dents, chipped paint, scratches etc.
- Open ANG hinged top cover and visually inspect interior mounted assemblies, and connectors.
- If ANG is to be rack or wall mounted, be certain the proper mounting hardware is provided.
- Inspect all field wiring connectors and switches. There must not be any damage to these connectors or switches.
- Check internal power supply(s) for damage.

Reporting Damage

If there is any evidence of damage to the shipping carton or the ANG notify the carrier and your local Siemens Applied Automation representative. Keep all shipping materials as evidence of damage for carriers inspection. Immediately contact your Siemens Applied Automation representative who will arrange for immediate repair or replacement. The Siemens Applied Automation Customer Service department can be contacted as follows:

Inside Oklahoma: 918-662-7430
Outside Oklahoma: 800-448-8224 (toll free)
Internationally: 001-918-662-7430

Pre Installation Planning

Description

This section provides information that can help you in preplanning your installation.

CAUTION

Before installing the Advance Network Gateway (ANG) within an existing LAN consult with your LAN administrator.

Figure 2-1. Wall Mounted ANG

The ANG is designed for wall or 19-inch rack mounting. Figure 2-1 shows the ANG wall mounted in an analyzer house. Note that the AC Power (Mains) breaker is located in close proximity of the ANG. Also note the I/O connections to the ANG_DN.

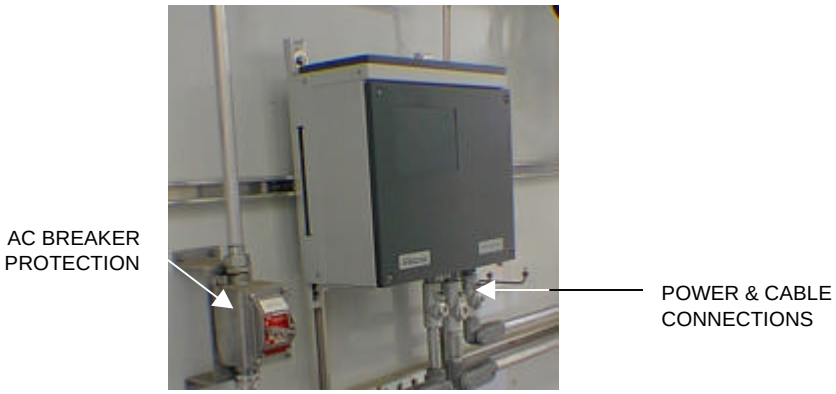
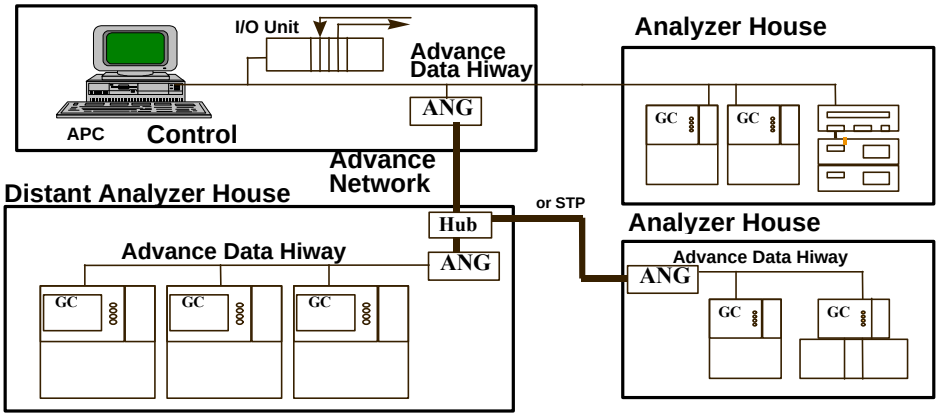


Figure 2-2. ANG_DN Installation

Figure 2-2 illustrates how a ANG can be used to physically extend a single loop of the Advance Data Hiway (ADH) by providing a conversion from the ADH media to Ethernet, or DataNET and back to the ADH media.

All segments of the system labeled “Advance Data Hiway” are according to standard installation practices (9182 Belden cable or equivalent); see Chapter 1. ANG_DN Specifications; page 4.



Wall or Rack Mounting Installation

Instructions

The Advance Network Gateway (ANG) should be:

- Installed in a location that is free from shock and vibration.
- Protected from direct sunlight and extremes of temperature.
- It is recommended that the unit be mounted within a shelter. This prevents it from being exposed to outside environmental conditions.

Package Configurations

The unit is designed for standard wall or Zone 1 wall installations, or 19-inch rack installations; see Chapter 1. Figures 1-2, 1-3, and 1-4. Shown below is a typical wall mount installation for NEC Division 2 or non-rated areas.

Wall Mounting

The mounting wall must be capable of supporting the weight of the unit; see Chapter 1., ANG_DN Specifications and Figures 1-3 and 1-4.

Wall Mount Installation: Use four, 5/16-inch (M8) or 3/8-inch (M10) lag bolts to mount the unit to the wall. Mounting bolts must be secured to solid wall construction members such as studs and into the wall only. Allow adequate clearance on the left side to allow the door to swing open.

Zone 1 Wall Mount Installation: Use four, ¾-inch (M20) lag bolts to mount the NAU to the wall. Mounting bolts must be secured to solid wall construction members such as studs and into the wall only.

Wall or Rack Mounting Installation, Continued

Rack Mounting

The ANG rack mount configuration is designed for a standard 19-inch cabinet. The cabinet should have at least seven inches of vertical space for mounting the unit. See Figure 1-2 for minimum width and depth mounting dimensions.

CE Installations

For installation sites that must conform to CE (Conformite Europeene) Certification see page 22, CE Installations.

Wiring Requirements

The wiring routing and entry requirements for the ANG are dependent upon the site requirements; see page 18, Site Wiring Requirements:

- CE (Conformite Europeene) Certified Area; see Page 22
- NEC Division 2 or Non-Hazardous Areas
- Cenelec Zone 1 or Zone 2 Areas
- Rack Mounting Non-Hazardous Area.

Site Wiring Requirements

Description

The type of wiring is dependent upon the site requirements:

- CE (Conformite Europeene) Certified Areas
- NEC Division 2 or Non-Hazardous Areas
- Cenelec Zone 1 or Zone 2 Areas
- Rack Mounting Non-Hazardous Area

AC Mains Wiring

The installation should have a power disconnect external to the enclosure.

No voltage dependent selections need to be made on the power supply, as it has a universal input.

CE Installations

See Page 22, CE Installations.

NEC Div 1, Div 2 or Non Rated Areas

Use Metal Conduit wiring method.

Conductor type: Power cable sized for circuit protection chosen.

Cenelec Zone 1 or Zone 2 Rated Areas

Use Cable Gland wiring method:

Conductor type: Power cable sized for circuit protection chosen, and must be shielded.

Non Rated Areas or Rack Mounting

Use Metal Conduit wiring method.

Conductor type: Power cable sized for circuit protection chosen.

DataNET Channels

The DataNET channel connections can be either copper wire or fiber optic cable. The wiring method and cable type for DataNET is dependent upon the site requirements. For cable requirements see Table 2-1.

Table 2-1. Recommended DataNET Cable

The following Table should be used when evaluating or selecting cable for an existing or new DataNET installation.

Cable Type	Vendors & P/N	Installation Notes
Fiber Optic MM 62.5/125; 4 Fiber Conductors Required for TX/RX Redundancy	SAA P/N 1270002-002 Industry Available from Multiple Vendors	New Installation as an alternative to copper cable Max distance from Analyzer to ANG or between Hubs 1520 meters (5000 ft)
2- Conductor Copper Wire	SAA P/N 1686002-001 Belden P/N 9182 For Belden Armored Cable order SAA P/N 1680000-002	Recommended for Single Channel Max distance from Analyzer to ANG or between Hubs 1520 meters (5000 ft)
4-Conductor Copper Wire	SAA P/N 1681000-003 Belden P/N SSD1743	Recommended for Dual Channel Max distance from Analyzer to ANG or between Hubs 1520 meters (5000 ft)

Table 2-1. Recommended DataNET Cable, Continued

Cable Type	Vendors & P/N	Installation Notes
Twisted Pair Copper Wire used in SAA 2100 Installations	SAA P/N C00128 Belden P/N 9462	Not Recommended for New Installations Nominal capacitance 155 pF/m (50 pF/ft.) Max distance from analyzer to ANG or between hubs 225 meters (750 ft)
All other Copper Wire		Not Recommended Customer Responsibility for testing and conformity requirements

Copper Wire Site Requirements

The following information pertains when using copper wire

CE Installations

See Page 22, CE Installations.

NEC Div 2 or Non-Hazardous Rated Areas

Use approved Conduit wiring method. Conduit may contain multiple cables. Adhere to all Federal and local electrical code requirements.

Cable Type: Refer to Table 2-1.

Cenelec Zone 1 or Zone 2 Rated Areas

Use Cable Gland wiring method. Each cable gland allows entry of one cable.

Cable Type: Recommend Belden 9182 or armored Belden 9182 or equivalent. The proper cable gland must be used to connect the armor or shield to the enclosure. Other cables with individually shielded pairs can be used, but decreased distance is allowed (typically ~800-1000 feet for 22 to 26 AWG low capacitance communication cable ~ 50 to 500 is allowed.

Non-Hazardous Areas or Rack Mounting	Use approved flexible non-metallic conduit wiring method. Conduit may contain multiple cables. For CE installations use only cable gland wiring method. Cable Type: Recommend Belden 9182 or equivalent. Other cables with individually shielded pairs can be used, but decreased distance is allowed

DataNET Channel Connections

The DataNET channel connections can be either copper wire or fiber optic cable. The wiring method and cable type for DataNET is dependent upon the site requirements.

CE Installations	See Page 22, CE Installations
NEC Div 2 or Non-Hazardous Areas	Use approved Conduit wiring method. Conduit may contain multiple cables. Adhere to all Federal and local electrical code requirements. Cable Type: Duplex fiber, 62.5/125 micron; see Table 2-1. Connection: Type ST fiber connectors. Connect these to the appropriate transmitter and receiver ports for the respective channel.
Cenelec Zone 1 or Zone 2 Rated Areas	Use Cable Gland wiring method. Each cable gland allows entry of one duplex fiber cable. Cable Type: Duplex fiber, 62.5/125 micron. Connections: Type ST fiber connectors. Connect these to the appropriate transmitter and receiver ports for the respective channel.
Non-Hazardous Areas or Rack Mounting	Use approved flexible non-metallic conduit. Conduit may contain multiple cables. Conduit may contain multiple. This method is suitable for CE installations. Cable Type: Duplex fiber, 62.5/125 micron. Connection: Type ST fiber connectors. Connect these to the appropriate transmitter and receiver ports for the respective channel.

CE Installations

Description

This section should be used for installation sites that must conform to CE (Conformite Europeene) Certification. Typically, this does not apply to installations outside the EC unless the equipment was purchased with the explicit requirements and expectations that it shall conform to EC Electromagnetic and Radio Frequency Interference (EMI/RFI) rejection specifications.

CE Installation Kit

Available from Siemens Applied Automation CE Installation Kit P/N 2020264-001. This kit has all the parts for all the installations referenced in this section.

Instructions

The following information pertains to CE Installation of General Purpose, Zone 1 and Division 2 Equipment. For Zone 1 Installations, all cabling is terminated in the ANG Zone 1 Enclosure.

Installation with Metallic Conduit

The preferred method is to route the field wiring in metallic conduit. If metallic conduit is used, unshielded power and the signal wires can be used. The power and signal wires (DataNET or Ethernet) must be routed in separate conduit.

Using flexible conduit and/or armored cable is equivalent to using “steel conduit”. Flexible conduit or armored cable must have its flexible conduit and/or armoring conductivity 360-degree terminated at its entry to the enclosure (or bulkhead).

Installation without Metallic Conduit

If conduit is not used, the following installation practices must be used to ensure that the CE certification remains valid:

1. A shielded power cord or cable must be used for the input power wiring. The shield must be terminated at the unit in a 360-degree termination at the enclosure (bulkhead); use Siemens Applied Automation P/N 2015729-001 contained in the CE Installation Kit or an equivalent part. For Zone 1 Installation use Siemens Applied Automation P/N 1311001-014 Installation Kit.

2. The DataNET copper cables shields must be terminated in a 360-degree termination at the enclosure (or bulkhead; use Siemens Applied Automation P/N 2015729-001 contained in the CE Installation Kit or an equivalent part). For Zone 1 Installation, use Siemens Applied Automation P/N 13111001-014 Installation Kit.

3. A split ferrite filter must be clamped to DataNET copper wire and fixed immediately to the outside of the unit; use Siemens Applied Automation part number 1173000-013 ferrite contained in the CE Installation Kit. This is required to meet the Conducted Immunity requirement for CE/EMC Heavy Industrial. All other CE/EMC Heavy Industrial requirements are met without the use of a ferrite clamp.

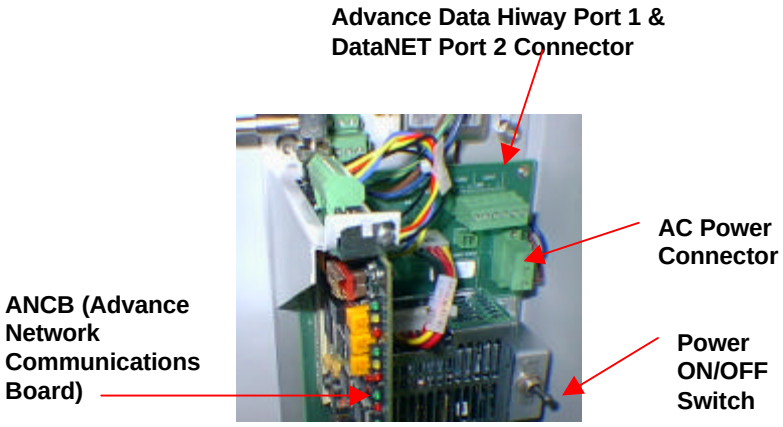
4. Shielded Ethernet cable must be used for all Ethernet connections, in and outside the GC, and coupled through the enclosure using a shielded RJ-45 coupler; use Siemens Applied Automation part number 1183200-003 contained in the CE Installation Kit. A mounting plate (Siemens Applied Automation part number 2020261-001) is also available to accomplish this. If needed for Zone 1 installation, Siemens Applied Automation part numbers 2017984-001 and 2017985-001 is available to maintain purge. If a PG gland is used to make the 360-degree termination of the Ethernet shield at the enclosure, the Installation Kit and other parts are not required.

Wiring Connections

Description

All input ac power and communications connections are made to connectors located on each of the ANCB modules. To gain access to the modules, open the front panel of the ANG. For Zone 1 units refer to the Figure 1-4, Zone 1 Outline Drawing

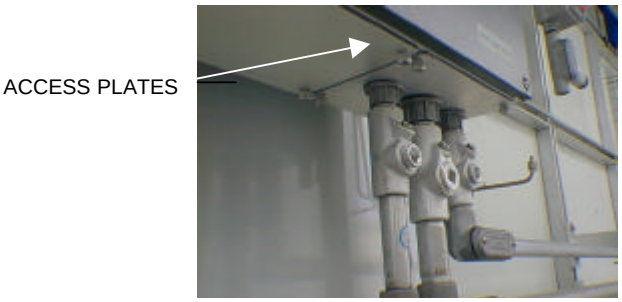
Figure 2-4. ANCB Module


Advance Data Hiway Port 1 & DataNET Port 2 Connector
AC Power Connector
ANCB (Advance Network Communications Board)
Power ON/OFF Switch

I/O Wiring

Two removable wiring access plates permit all the wiring to be made through the bottom section (wall units) or rear section (rack units) of the ANG. The plates can be punched to accommodate conduit or cable gland connectors. For Zone 1 units refer to the Figure 1-4, Zone 1 Outline Drawing.

Figure 2-5. Wiring Access Plate



Instructions

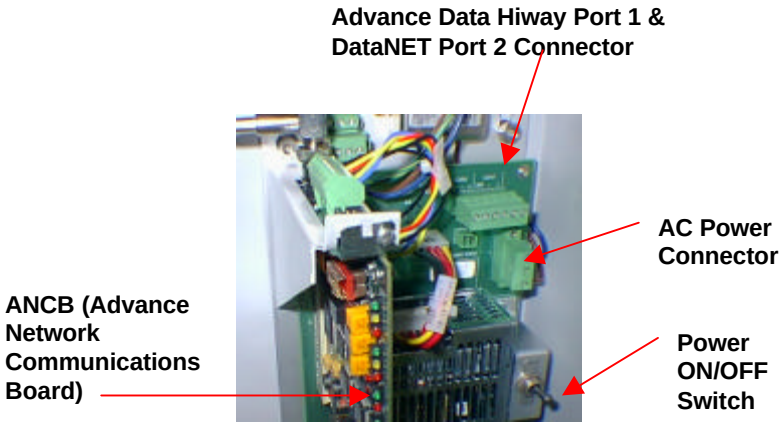
IF you are wiring …	THEN go to …
AC Power (Mains) Connections	Page 25
Data Hiway Cable Connections	Page 28
DataNET Connections	Page 31

AC Power (Mains) Connections

ANG Power Supply

Each of the ANCB modules has a power supply assembly. The power supply can accept inputs from 85-264 VAC, 47-63 Hz without the need for setting switches or jumpers.

ANCB Module


Advance Data Hiway Port 1 & DataNET Port 2 Connector
AC Power Connector
ANCB (Advance Network Communications Board)
Power ON/OFF Switch

Installation Note

Depending upon the user configuration the power supplies can be connected in parallel and powered from a single power source or they can be powered from two independent power sources. In either case disconnects must be provided for each input power source.

Before You Begin

The ANG should be installed in a rack or wall mount; see Wall or Rack Mounting Installation; page 16. How you route the cable and wire to the unit is dependent upon the site requirements. See Site Wiring Requirements (page 18) to determine the requirements for your site.

All wiring shall conform to the National Electrical Code (NEC) and/or other national or local code requirements.

Instructions

Step	Action
1.	Shut off the primary AC Power Supply lines to this location.
2.	Open the door of the ANG by loosening the four captive screws located on each corner; use a 4mm Allen wrench.

Step	Action
3.	Install 15-Ampere circuit breakers; disconnect switches or receptacles in the incoming power supply lines or two switched receptacles near the unit. This will ensure the power supplies will be completely separated from each of the power sources. Label the breakers or receptacle boxes to make sure that the circuits are clearly identifiable. Note: For one input power sources only a single breaker box or switch receptacle is required.
4.	Remove the wiring access plates from ANG. Punch holes as required for either conduit or cable gland connectors for both power and I/O lines. Install connectors and replace the plates. For Zone 1 units (Figure 1-4) use one of the pre tapped holes **Important** If you are going to install a Fiber Optic Coupler Assembly select the egress locations and punch required holes.
5.	Route input power, in accordance with pertinent electrical codes and regulations, to ANG. Use entry holes provided in step (4).
6.	Locate the AC Power Input connector. To make the AC connections easier the Power Input Connector comes apart. Simply loosen the two recessed captive screws, grasp the top portion of the connector and pull it straight out from the base connector. Loosen the top wire retaining screws from the removed connector. Strip the insulation ¼ -inch back from each of the input power leads. Insert each lead in the correct location, and tighten down the retaining screws.

AC Power (Mains) Connections, Continued

Step	Action
7.	Plug the connector back into its base and secure down with the two recessed captive screws.
8.	If using redundant power supplies repeat steps 6 and 7. If not, use connecting wires to parallel connect to the other power supply.
9.	Locate the ANG chassis ground lug ⏚ and connect wire from it to the building's ground connection.
10.	Inspect all connections for shorts or loose connections.
11.	You are now ready to connect the ADH and DataNET channels; go to page 31.

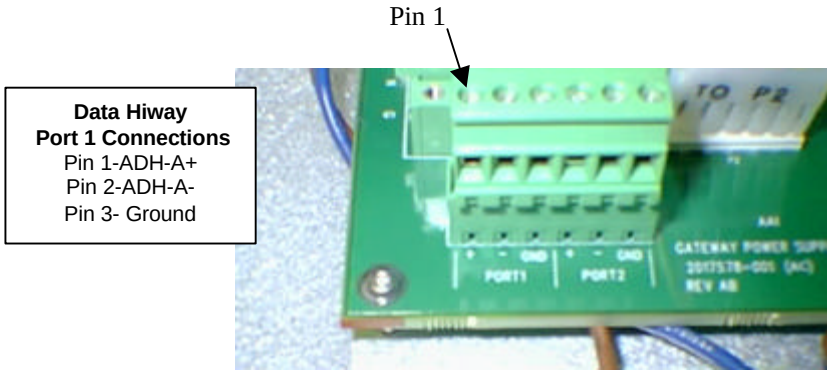
Data Hiway Connections

Description

This section provides instructions for connecting the ANG_DN to an existing Data Hiway.

Figure 2-6. Data Hiway Connector

The DataNET Gateway unit consists of two ANCB boards. One ANCB board is configured as the channel A board and the other as the Channel B board. The ADH Channel is connected to Port 1 while the DataNET Channel is connected to port 2, see page 48, step 2.



Data Hiway Cable

The Advance Data Hiway requires a low capacitance, twin axial, 150-ohm cable. The cable can be purchased from Siemens Applied Automation. See the table below for ordering the correct cable:

Dual Channel Installation	Standard Oval Cable Siemens Applied Automation P/N 1681000-003 (Belden P/N SSD1743)
Dual Channel Installation	Used for larger radius bends Siemens Applied Automation P/N 1686002-002 (Alpha P/N 516689)
Single Channel Installation	Siemens Applied Automation P/N 1686002-001 (Belden 9182, Alpha P/N 9283, Manhattan P/N 39240)

Data Hiway Connections, Continued

More Information

For technical information on the Data Hiway refer to Appendix A in the Optichrom Advance Library Set, Volume 2, Board Installation and Strapping Manual.

Instructions

Step	Action
1.	Turn off AC Power (Mains) to the ANG. Turn off AC Power (Mains) to the ANG. ⚠ **WARNING** Placing the Power Supply Assembly toggle ON/OFF switch to OFF does not remove the main voltage to the unit. To remove all input power to the unit, the external AC Power (Mains) to the unit needs to be shut off.
2.	Route the Data Hiway cable to the ANG_DN in accordance with national or local electrical codes and regulations via the holes drilled in the access plate; see Figure 2-1.

Installation Note

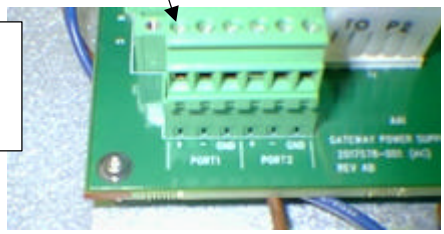
To make the Data Hiway connections easier we have made the Data Hiway port connector a removable connector. Simply grasp the top portion of the connector and pull it straight out from the base connector.

CAUTION
⚠

Do not plug-in the wired Data Hiway connector until you have set the loop and unit number; see Chapter 3. Data Communications Setup.

3.	Designate which ANCB will be Channel A and which will be Channel B. We suggest the right module be channel A.
4.	Locate the Channel A, Port 1 connector. To make the connections easier the connector comes apart. Simply loosen the two recessed captive screws, grasp the top portion of the connector and pull it straight out from the base connector.
5.	Loosen the top wire retaining screws from the removed connector. Strip the insulation ¼ -inch back from each of the connector leads.

Instructions, continued

Step	Action
6.	Connect the ADH Channel cable to channel A port 1, ADH + and - terminals. Connect the ADH Channel B to Port 1 on the Channel B designated board. Tighten down all the retaining screws. Pin 1 **Data Hiway Port 1 Connections** Pin 1-ADH-A+ Pin 2-ADH-A- Pin 3- Ground  ADH cable shields are grounded at one end only. If ground is at ANG end, use GND terminal.
7.	Repeat steps 6 and 7 for Channel B, Port 1 connector.
8.	Perform Data Hiway Post Installation Test; refer to Appendix A. How to Test the Data Hiway.
9.	Remove the ADH plug connector from each ANCB. Do Not make final connections until you have set the loop and unit number; see page 47 Setting Network Address & Loop and Unit Numbers.
10.	You are now ready to make the DataNET connections; go to page 31.

DataNET Connections

Description

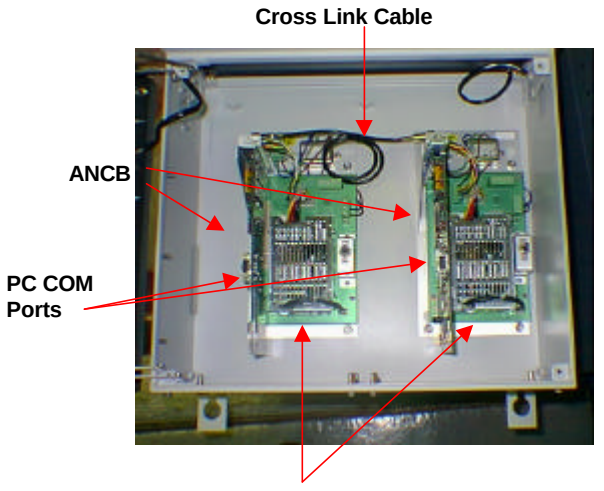
The DataNET ports can accept copper or fiber optic cables. All connections are made to connectors located on each ANCB module.

If the unit is to be installed in an existing Data Hiway installation the existing Data Hiway wiring can be used.

Channel Designation and IP Address

The ANG enclosure houses two identical ANCB modules. Each ANCB provides either a channel A or B channel network interface for one Data Hiway channel and one DataNET channel.

An internal Ethernet cross-link connection via the Ethernet 10Base2 (BNC) port provides the communication link between the two modules.



Instructions

IF you are wiring for …	THEN go to …
DataNET Copper Connections	32
DataNET Fiber Optic Cable Connections	34

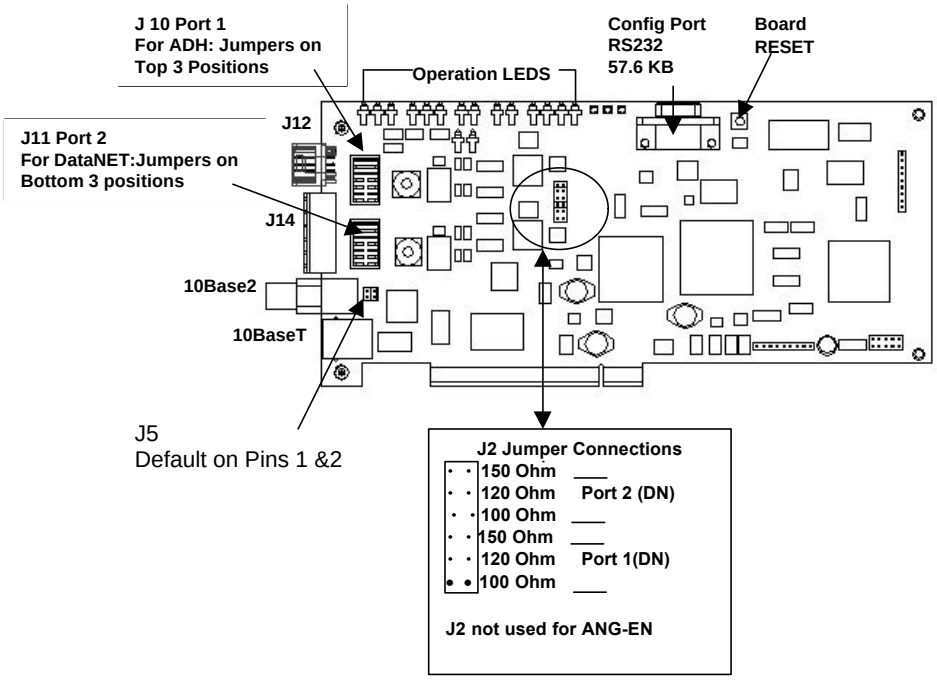
DataNET Copper Connections

Before You Begin

The wiring method (conduit or cable glands) and which cable type you use is dependent upon the site requirements. Review the Site Wiring Requirements page 19 to ensure that you are using the correct cable and wiring method.

Figure 2-7. ANCB Board Jumper Settings

Refer to ANCB Description page 74.



Instructions

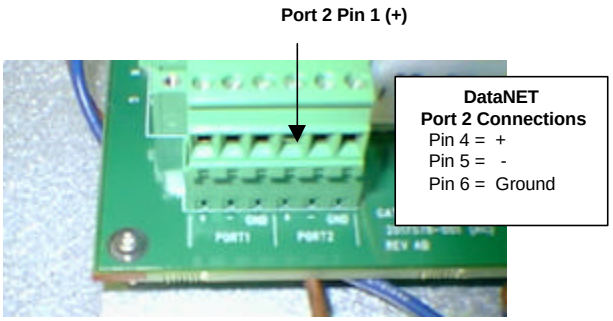
Step	Action
1.	Turn off AC Power (Mains) to the ANG. **⚠ WARNING** Placing the Power Supply Assembly toggle ON/OFF switch to OFF does not remove the main voltage to the unit. To remove all input power to the unit, the external AC Power (Mains) to the unit needs to be shut off.
2.	Route the DataNET copper cable to the ANG in accordance with national or local electrical codes and regulations via the holes drilled in the access plate; see Figure 2-1.

DataNET Copper Connections, Continued

Installation Note

To make the connections easier we have made the port connector a removable connector. Simply grasp the top portion of the connector and pull it straight out from the base connector.

Instructions, continued

Step	Action
3.	Designate which ANCB module will be Channel A and which will be Channel B. We suggest the right module be channel A.
4.	Locate the Port 2 connector. To make the connections easier the connector comes apart. Simply loosen the two recessed captive screws, grasp the top portion of the connector and pull it straight out from the base connector  Important All DataNET copper connections are made to Port 2. Do Not make any DataNET copper connections to Port 1.
5.	Loosen the top wire retaining screws from the removed connector. Strip the insulation ¼ -inch back from each of the connector leads.
6.	Connect the Channel A, DataNET wires to port 2 terminals. Repeat for Channel B, DataNET connections. Tighten down the retaining screws
7.	Plug DataNET cable connectors into their base connectors.

DataNET Fiber Optic Connections

Description

The Fiber Optic Coupler is mounted in a threaded, potted, gas tight fitting assembly designed for use in hazadrous areas when properly installed in a approved enclosure. The ANG_DN uses two Fiber Optic Couplers, one for Channel A, Port 2 (DataNET Channel A) and one for Channel B, Port 2 (DataNET Channel B).

Required Parts

All mounting hardware is supplied with the DataNET Fiber Optic ANG parts kit. These parts are also available as spares and can be ordered from us.

Description	Part Number
Fiber Optic Coupler Assembly	2015828-001
Fiber Optics Coupler Seal Nut	N8005
Fiber Optic Coupler Cable	2020947-001

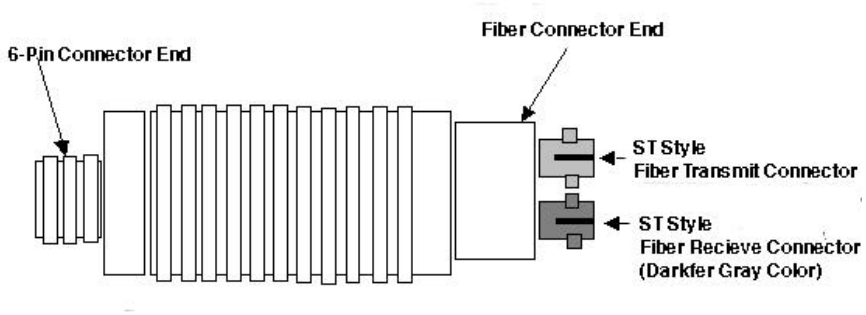
Fiber Optic Coupler

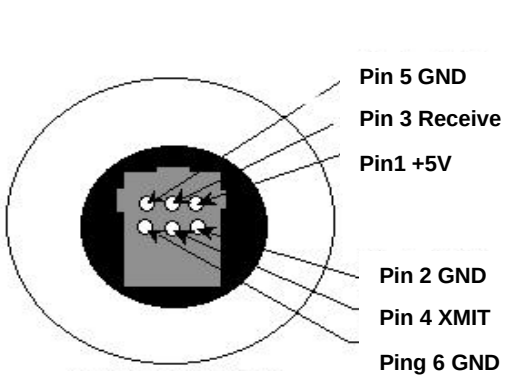
The DataNET Fiber Optic Coupler performs translation of signals between a DataNET Hub and a ANG_DN gateway. The Fiber Optic Coupler converts between electrical signals and optical signals. The conversion is transparent to the network. Fiber Optic signals are impervious to distubances caused by electrical interference from nearby equipment, ground loops, power surges, or nearby lightning strikes.

DataNET Fiber Optics Couplers can drive up to 5000 feet of fiber optic cable.

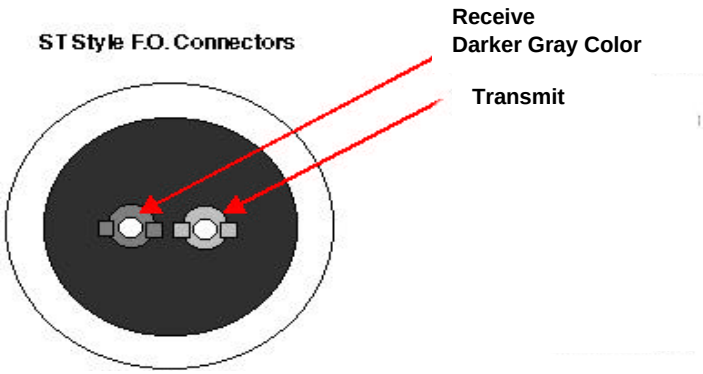
Figure 2-8. Fiber Optic Coupler

The DataNET Fiber Optic Couplers use **ST-style** connectors (twist & lock). Always insure that the TX (Transmit) on one end of the link is connected to the RX (Receive) at the other end of the link. Some duplex fiber optic cables are coded to help monitor the direction of data travel. If the fibers are not coded, special attention must be paid to insure a proper connection.





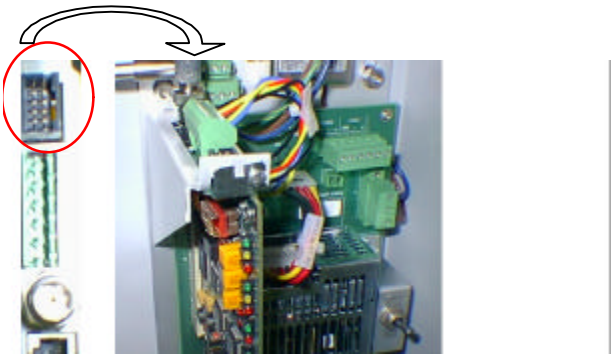
Connector End View



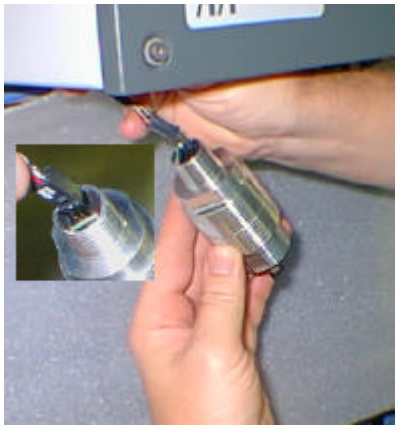
Fiber End View

Instructions

Since there is a Fiber Optic Coupler for each channel the following procedure should be repeated for each channel.

Step	Action
1.	Turn off AC Power (Mains) to the ANG. **⚠ WARNING** Placing the Power Supply Assembly toggle ON/OFF switch to OFF does not remove the main voltage to the unit. To remove all input power to the unit, the external AC Power (Mains) to the unit needs to be shut off.
2.	Connect the Fiber Optic cable, 10-pin connector to J12 on the ANCB. **J12** 
3.	Since the DataNET is connected to Port 2 on each ANCB only the Channel B pair of fiber optic cable is connected to the Fiber Optic Coupler. Tieback to the cable the 6-pin connector labeled Channel A. Connect the Channel B cable to the Fiber Optic Coupler.

Instructions, continued

Step	Action
4.	Route the other 6-pin connector through the holes drilled in the access plate and connect to the Fiber Optic Coupler Assembly. 
5.	Through the access plate holes mount the Fiber Optic Coupler Assembly using the hardware that came with it. For Zone 1 units (Figure 1-4) mount the assembly through one of the pre tapped holes.
6.	Connect the Fiber Optic cable transmit and receive lines to the ST connectors on the assembly; see figure 2-8. The DataNET Fiber Optic Couplers use **ST-style** connectors (twist & lock). Always insure that the TX on one end of the link is connected to the RX at the other end of the link. Some duplex fiber optic cables are coded to help monitor the direction of data travel. If the fibers are not coded, special attention must be paid to insure a proper connection.

Chapter 3

Data Communications Setup

Introduction

Overview

This chapter provides maintenance personnel instructions for configuring the Advance Network Gateway with DataNET (ANG_DN). Once the operational settings are made the unit will function as a communication router on an Advance Communication System (ACS) network.

Command Line Definitions

Review Chapter 4, Command Line Summary. Chapter 4 provides definitions for all of the commands you will be using in this chapter.

Chapter Preview

This chapter provides the following information:

Topic	Page
Configuring Your PC	40
Establishing a Connection	44
Setting Network Address & Loop and Unit Numbers	47
Assigning an IP Address	50
Editing the Address Translation Table	51
Firmware Updates	56

Configuring Your PC

Description

The Advance Network Gateway (ANG) provides a user interface called CLI (Command Line Interface). Any communication program capable of VT100 terminal emulation can be used to communicate with the CLI interface. The Windows® Hyper Terminal is the recommended communication program.

Baud rate:	57.6k baud
Data bits:	8
Parity:	none
Stop bits:	1
Flow control:	none

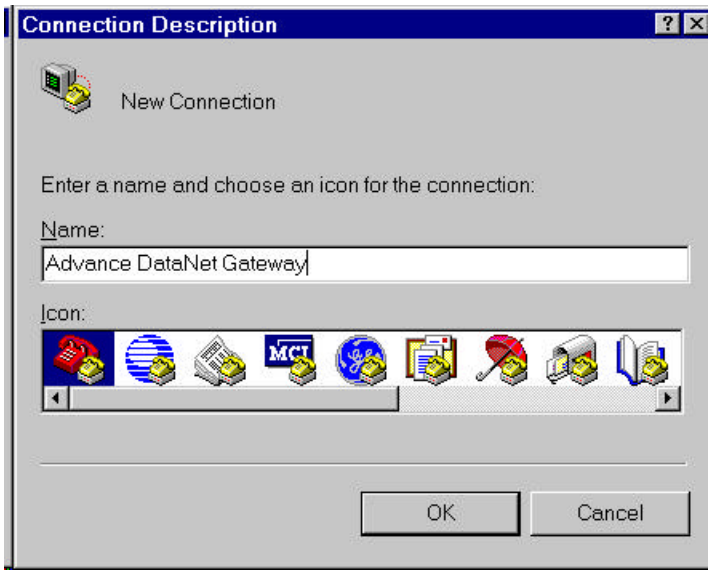
Instructions

The following procedure uses the Windows **HyperTerminal** program, to connect to the ANG.

1. Click the Start button, and then click on **Programs.**

2. Click the **HyperTerminal** icon to start the Program.

   Connection Description dialog box will open.



3. In the **Name** field, type in a Connection Name. Example: Advance DataNET Gateway.

4. In the **Icon** field select an Icon to represent the name selected.

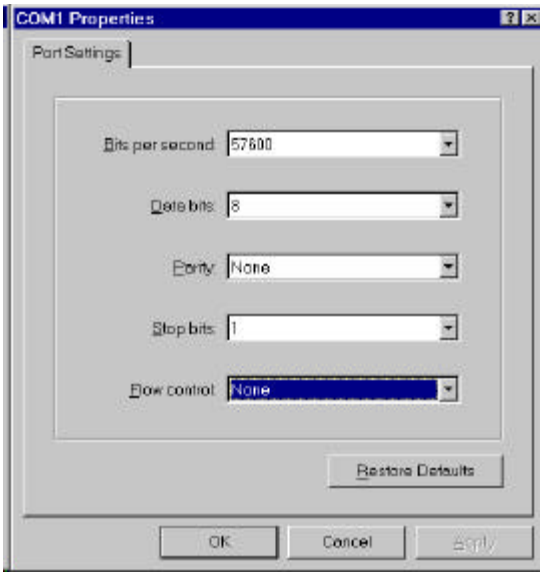
5. Click OK.

   The Connect To dialog box opens.

6. From the **Connect using** scroll list choose the COM port number you will be using on the PC to connect to the ANG configuration port.

7. Click OK to save the selection.

   The COM Properties box opens.



8. Scroll each field and select the following Port Settings:

   Bits per second: 57600

   Data Bits: 8

   Parity: None

   Stop bits: 1

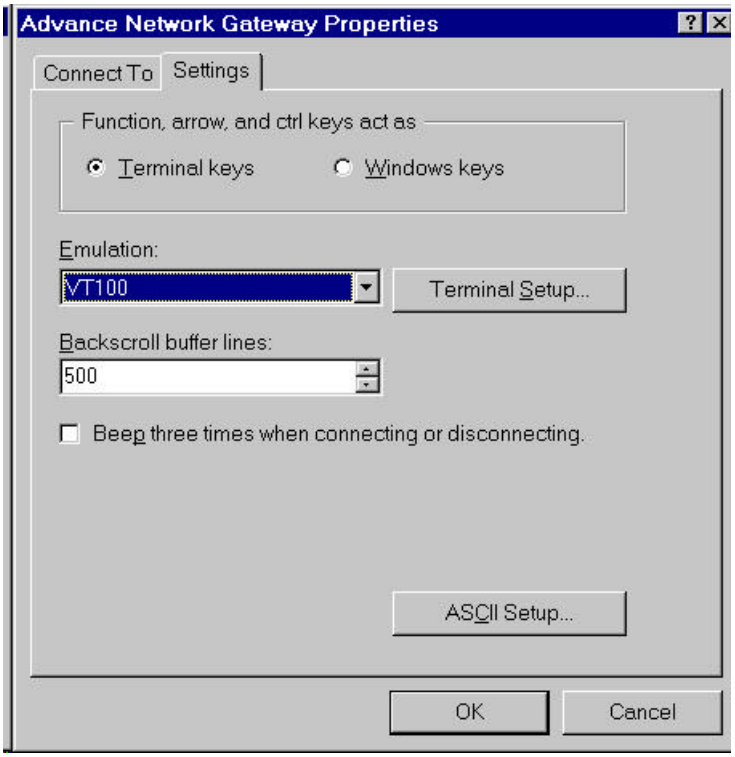
   Flow Control: None

9. Click OK.

   The Main Menu will appear.

10. Click File and choose Properties from the drop-down menu.

    The Advance DataNET Gateway Properties box will appear.



11. Click Settings tab.

12. From the **Emulation** scroll list select VT100. Do not change the default settings for the other parameters.

13. Click **Terminal Settings** button.

    The Terminal Settings dialog box will appear.

14. Click **OK** to accept the default settings.

    The Advance Network Gateway Properties box will appear.

15. Click **ASCII Setup** button.

    The **ASCII Setup** dialog box will appear.

16. Click **OK** to accept the default settings and return to the **Settings** tab.

17. Click OK to return to main menu.

18. Enter the short cut name. Click **Save** to complete the setup.

Your PC is now setup to connect to and configure the ANG.

To create a shortcut to the new connection you just entered and place it on your Desktop, select the file name you entered in step 18 and click the right mouse button. From the pop-up menu select **Create Shortcut**.

Once the shortcut is created it can be moved to the Desktop. Simply click the shortcut icon and drag the icon while holding down the left mouse button. Release the mouse button to place the icon.

Establishing a Connection

Description

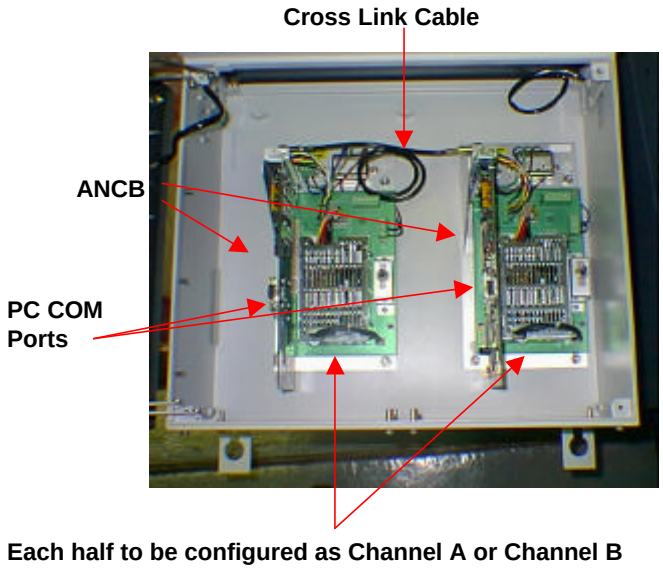
Once your PC is set up, as described in **Configuring Your PC,** you are ready to connect to and configure the ANG_DN.

Getting Started

… read through this Chapter prior to performing any procedures.

Dual System

The unit is a fully redundant unit with dual advance network communications boards (ANCB) and power supplies. Each half is assigned a channel designation (A or B) and an IP Address.



Before You Begin

1. Connect a standard 9-pin COM cable from the designated PC COM port (Figure 2-7) to RS232 Configuration Port located on etiher ANCB.
2. Turn on the AC power to the ANG.

Password Protection

The user interface program is password protected. This insures the data integrity of all configuration data and limits unwanted access of the User's network. To access any of the programs you must logon with the correct password.

Password Format

A password name can consist of any combination of alphanumeric characters. The alphanumeric name must have a minimum of five and a maximum of twenty characters. The ANCB is shipped from the factory with the word "***password"*** entered as the default password name.

How to Change Password

The user can change the password name at any time. To do this login using the current password then type: "***password stand stand"***. Where the word stand is your new password entered twice to verify that it was properly entered.

How to Log Out

You may log out or close the Configuration and Diagnostic program at any time by typing **logout**. However, the Configuration and Diagnostic program will automatically log you out after five minutes.

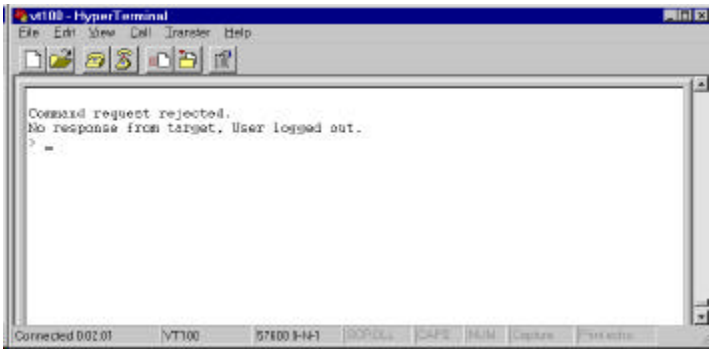
How to Log On

The following procedure assumes that the HyperTerminal program, residing on your PC has been configured to communicate with the ANG and the PC is connected to the ANCB Configuration Port.

1. Open Windows HyperTerminal program.

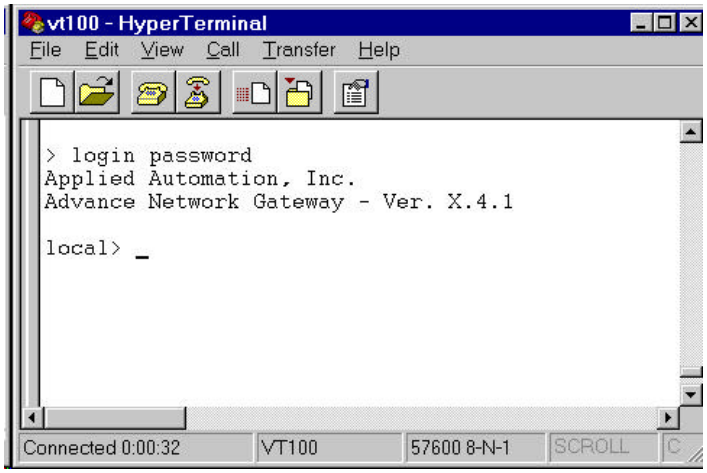
2. Press ¿ **Enter** twice

   The following dialog box appears:



3. At the > prompt type: **login password** and press ¿ **Enter.**

   The Connect Screen will appear with the login information and the local prompt. The local prompt indicates that you are communicating with the ANG connected directly to the PC.



You are now ready to configure the ANG, go to page 47.

Remote Connection Log On

If your PC is connected to one of the ANG configuration ports you can connect to any other hub on the same network if you know the IP address of the ANG.

1. Open Windows HyperTerminal program on your PC.

2. Press ¿ **Enter** twice, the Command Request dialog box will appear.

3. At the > prompt type: **login password [IP Address].**

Once the password is verified the system responds with the login information and displays the remote prompt which includes the IP address of the connected ANG.

Setting Network Address & Loop and Unit Numbers

Description

This section provides instructions to configure an Advance Network Gateway DataNET (ANG) with a network address. There are 4 levels of addressing that must be set on each ANCB:

1. A factory set Ethernet address.
2. An assigned IP address for each ANCB board using a common Sub-net-mask.
3. An assigned DataNET address that must be the same for both ANCB board half.
4. An assigned Advance Data Hiway loop and unit address that must be the same for both ANCB board half.

Before You Begin

1. Connect a standard 9-pin COM cable from the designated PC COM (see Figure 2-7) to one of the ANCB Configuration Ports.
2. Open Windows HyperTerminal program on your PC; reference **Configuring Your PC**, page 40.
3. Connect and Log on to DNH; reference **Establishing a Connection**, page 44.

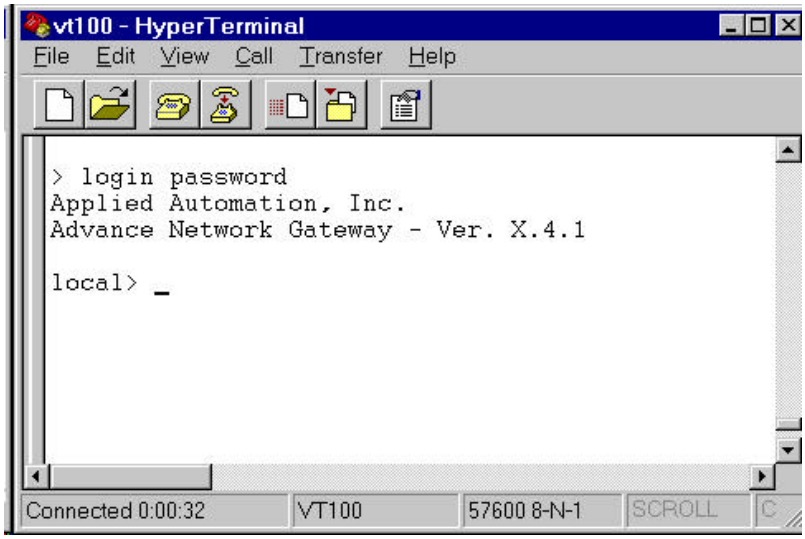
Command Line Definitions

Chapter 4, Command Line Summary, provides definitions for all of the commands you will be using in this chapter.

Instructions

1. Log on locally to the ANG.

   The Connect Screen will appear with the login information and the local prompt. The local prompt indicates that your are communicating with the ANG connected directly to the PC.



Learning Hint

Parameters are temporarily saved in RAM after being entered. However, parameters are not saved into long term storage (Flash) until you type 'reset'.

2. Designate the ANCB you are connected to as Channel A, at the Local > prompt type: ***config channel***

3. To configure the ANG_DN IP address, at the Local > prompt type: ***config address ip xxx.xxx.xxx.xxx***

   Where xxx.xxx.xxx.xxx should be replaced with the 12 digit unique network address. See Assigning an IP (Internet Protocol) Address page 50.

4. Press ↵ **Enter**.

5. To save your entry, at the Local > prompt type: **reset**

6. To configure the ANG_DN subnetmask, at the local > prompt type: ***config netmask xxx.xxx.xxx.xxx***

   Where xxx.xxx.xxx.xxx is the subnet mask for your network. Typically, this would be 255.255.0.0 or 255.255.255.0.

7. To configure the device id, at the Local > prompt type: ***config device id xxx.xxx.xxx.xxx***

8. Where xxx.xxx.xxx.xxx is typically the IP Address of Hub 'A'.

9. Press ↵ **Enter**.

10. Press ↵ **Enter**, and save your entry by typing at the local > prompt: **reset.**

11. To configure the ANG_DN Loop number, at the local > prompt type: ***config loop x***

12. Where x is a number in the range from 1 - 8 depending on the ADH Loop number of the Units to be connected directly to the ANG_EN ADH bus.

13. Press ↵ **Enter**, and save your entry by typing at the local > prompt: **reset**

Learning Hint

Parameters are temporarily saved in RAM after being entered. However, parameters are not saved into long term storage (Flash) until you type 'reset'.

2. Designate the ANCB you are connected to as Channel A, at the Local > prompt type: ***config channel***

3. To configure the ANG_DN IP address, at the Local > prompt type: ***config address ip xxx.xxx.xxx.xxx***

   Where xxx.xxx.xxx.xxx should be replaced with the 12 digit unique network address. See Assigning an IP (Internet Protocol) Address page 50.

4. Press ↵ **Enter**.

5. To save your entry, at the Local > prompt type: **reset**

6. To configure the ANG_DN subnetmask, at the local > prompt type: ***config netmask xxx.xxx.xxx.xxx***

   Where xxx.xxx.xxx.xxx is the subnet mask for your network. Typically, this would be 255.255.0.0 or 255.255.255.0.

7. To configure the device id, at the Local > prompt type: ***config device id xxx.xxx.xxx.xxx***

8. Where xxx.xxx.xxx.xxx is typically the IP Address of Hub 'A'.

9. Press ↵ **Enter**.

10. Press ↵ **Enter**, and save your entry by typing at the local > prompt: **reset.**

11. To configure the ANG_DN Loop number, at the local > prompt type: ***config loop x***

12. Where x is a number in the range from 1 - 8 depending on the ADH Loop number of the Units to be connected directly to the ANG_EN ADH bus.

13. Press ↵ **Enter**, and save your entry by typing at the local > prompt: **reset**

Assigning an IP Address

Overview

Each Advance Network Gateway (ANG) unit on a network must be assigned an IP address. This 32-bit number defines each unit's network ID and host ID. The user assigns the IP address before the unit is physically connected to a network.

See Setting Network Address & Loop and Unit Numbers, for instructions on how to enter the IP address.

IP Address

The IP Address consists of a 32-bit number divided into four 8-bit fields. Each field is expressed as a decimal number from 1 to 255 with each field separated by periods. This is referred to as "dotted decimal" notation. For example, 192.16.9.52 is an IP address.

How to Assign an IP Address

Ask your network administrator to assign you an IP Address, or if the ANG will be in a closed plant area and not connected to the Internet (World Wide Web) you can select an address from Table 3-1.

See Setting Network Address & Loop and Unit Numbers, for instructions on how to enter the IP address.

Table 3-1. Available IP Addresses

192.165.0.1	192.165.0.15
192.165.0.2	192.165.0.16
192.165.0.3	192.165.0.17
192.165.0.4	192.165.0.18
192.165.0.5	192.165.0.19
192.165.0.6	- 192.165.0.254
192.165.0.7	- 192.165.1.254
192.165.0.8	- 192.165.2.254
192.165.0.9	192.165.3.1 - 192.165.3.254
192.165.0.10	
192.165.0.11	
192.165.0.12	
192.165.0.13	
192.165.0.14	

Editing the Address Translation Table

Overview

The Advance Network Gateway (ANG) monitors the “local” ADH bus for messages with a “remote” destination address. The ANG determines if the message destination is “remote” by searching it’s Address Translation Table (ATT). If the destination address is located remotely, the ANG_DN encapsulates the ADH message within the data portion of an IP packet and sends the message out the Ethernet port.

Table Description

The Address Translation Table (ATT) records all known units that reside on the Advance Data Hiway (ADH). Each record within the ATT contains an ADH Loop / Unit number and the IP address of the ANG the unit is directly connected to. The ATT records are automatically added or updated each time an ADH broadcast is received. Each ANG broadcasts it’s ATT every 10 minutes. This insures the data intgerity of all ATT tables. An uninitalized ATT is automatically updated after 10 minutes by receiving ADH broadcasts and ANG_DN ATT broadcasts.

Important

Only Advance analyzer units broadcast on a periodic basis so it may be necessary to add other type units when a new ANG is added. An alternate method of updating the ATT is to force all ADH units to send a power-up broadcast by pressing the reset button or cycling the power.

Before You Begin

The following procedure assumes that the Windows Hyper Terminal program residing on your PC has been configured, the ANG_DN is operational and the PC is connected to the ANG_DN.

Important DataNET Gateway Users

If you are editing the translation tables for an Advance Network Gateway DataNET always disconnect the crossover link cable that connects the two ANCB's before editing any tables. Remember that if you edit the channel A designated ANCB, you must also edit the assigned channel B ANCB.

Displaying the ATT

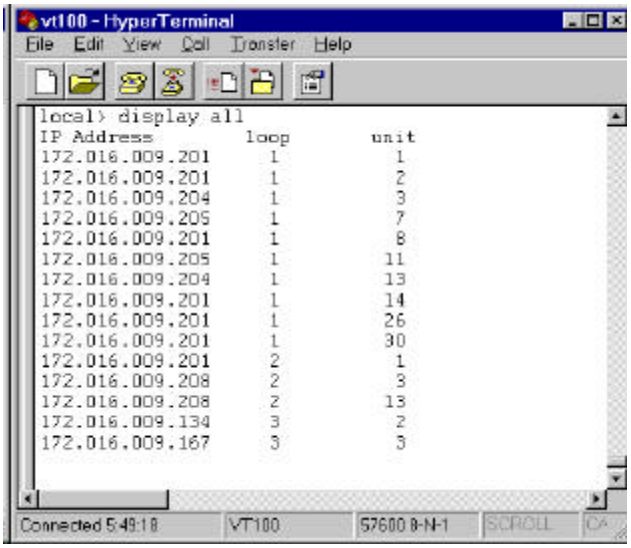
The Address Translation Table (ATT) can be displayed using the Configuration Management routines.

1. Connect a standard 9-pin COM cable from the designated PC COM (see Figure 2-7) to the Channel A ANCB Configuration Ports.

2. Open Windows HyperTerminal program on your PC; reference **Configuring Your PC**, page 40.

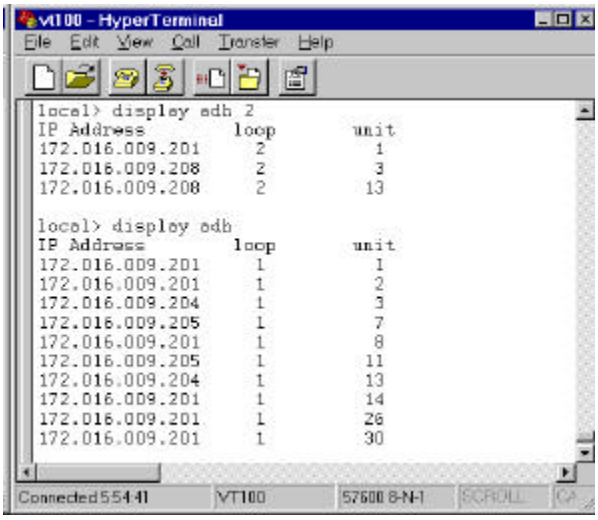
3. Connect and Log on to ANG; reference **Establishing a Connection**, page 44.

4. To display the entire ATT type at the Local > prompt: ***display all***



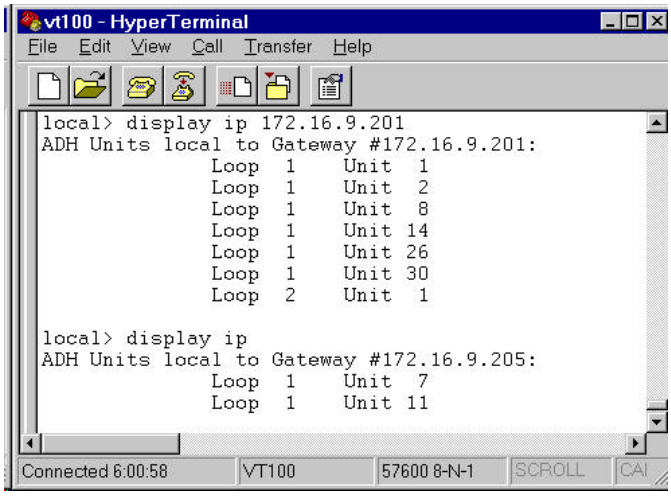
5. To display a single Loop only type: ***display adh x***

   Where ***x*** is the ADH Loop number. Allowable values are 1 - 8. If you leave off the ***x*** value then the Loop number will default to the Loop number of the local ANG_EN.



6. To display the ATT by IP number type: ***display ip xxx.xxx.xxx.xxx***

   Where ***xxx.xxx.xxx.xxx*** is the IP address. If you leave off the IP address, the IP portion will default to the value of the local ANG_DN. Note: 255.255.255.255 and 0.0.0.0 are not allowed.

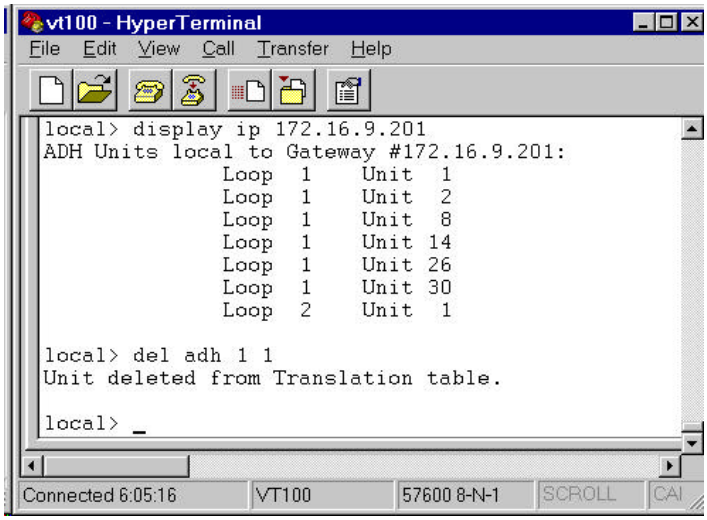


Editing the ATT

1. To delete a single entry from the ATT type: ***del adh loop unit***

   Where ***loop*** is the ADH loop number (1 - 8) and ***unit*** is the ADH unit number (1-31).

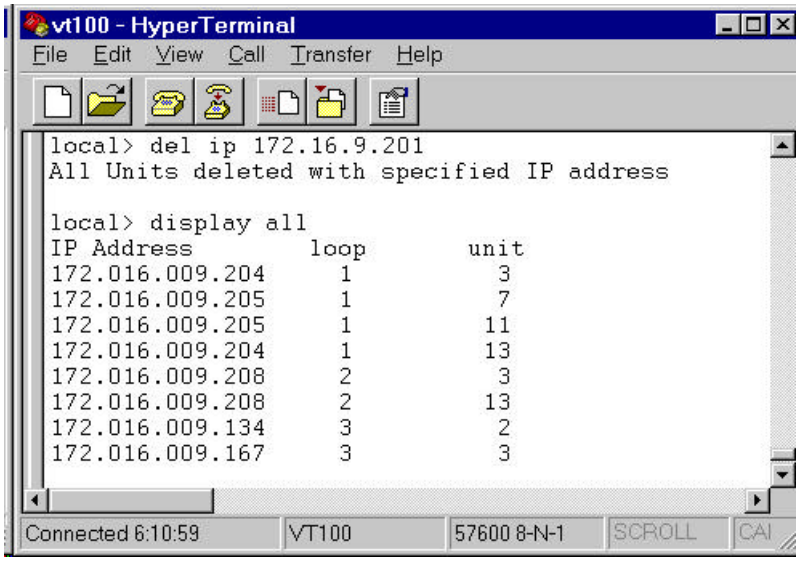
   All parameters must be specified.



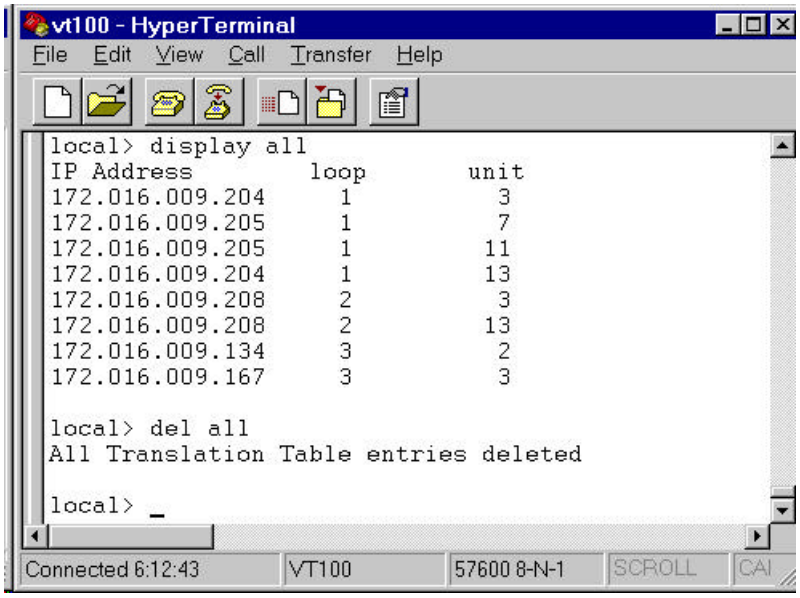
2. To delete all ATT entries associated with a single IP address type: ***del ip xxx.xxx.xxx.xxx***

   Where ***xxx.xxx.xxx.xxx*** is the IP address in dotted decimal notation.

   Note: 255.255.255.255 and 0.0.0.0 are not allowed.



3. To delete all entries in the ATT type: ***delete all***

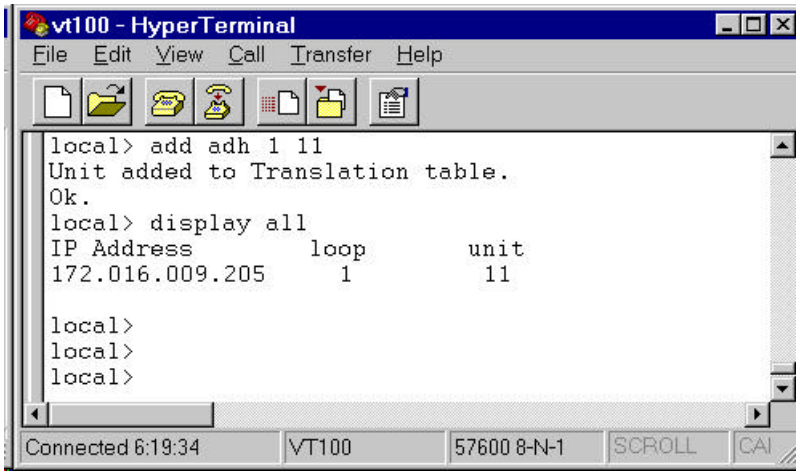


4. To add entries to the ATT type: ***add adh loop unit***

   Where ***loop*** is the ADH loop number (1 - 8) and ***unit*** is the ADH unit number (1-31).

   All parameters must be specified.

   You can only add entries that are local to the ANG_DN. If it is not directly connected to the ADH terminals you cannot edit it.



Firmware Updates

Description

Periodically we will provide our ANG users with firmware upgrades. Perform the following instructions to download a new ANG firmware upgrade to the ANCB board. A firmware upgrade will take approximately 5 minutes depending upon the speed of your PC hardware.

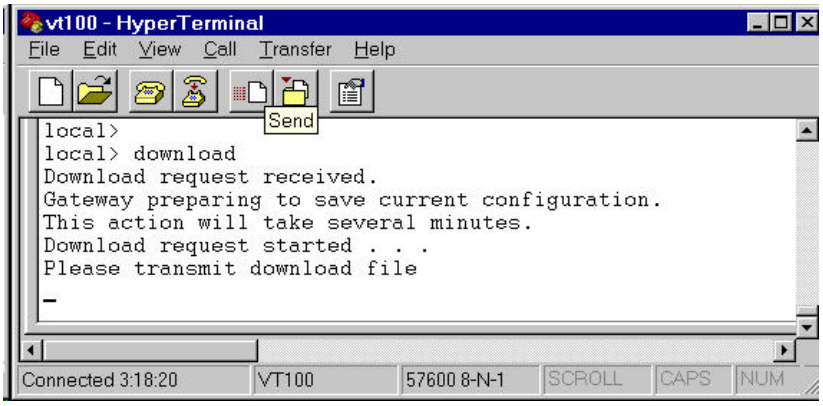
Instructions

The following procedure assumes that the Windows Hyper Terminal program residing on your PC has been configured, the ANG is operational and the PC is connected to the ANG.

1. Log on to the ANG.

2. At the **>** prompt type: ***download***

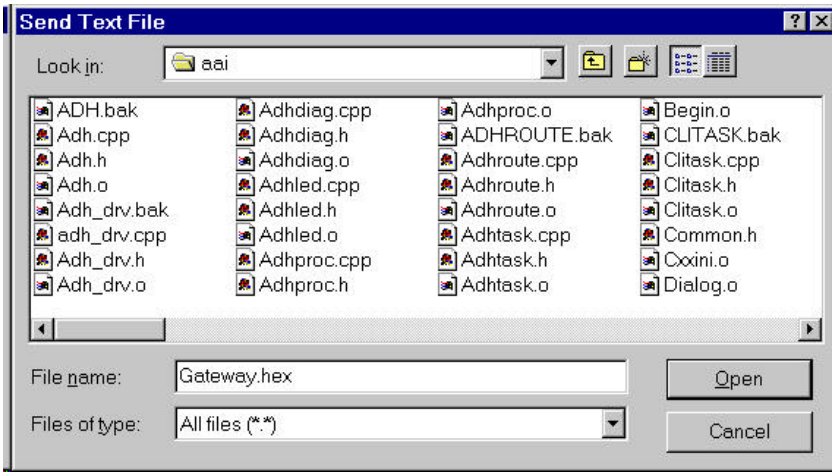
   You should see the following response on the screen. At this point the ANCB is ready to receive the new firmware version.



3. From the Main Menu bar click on **Transfer**.

4. Click on **Send Text File.**

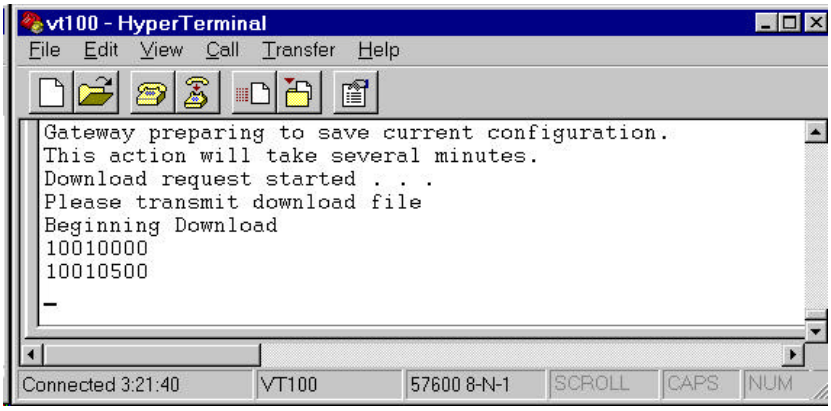
   The Send Text File dialog box will appear.



5. Under **Files of type** select All files (*.*).

6. Under **File name** type in the upgrade version file name (ANG_DNCP.MOT).

   This will start the down loading of the files. Once the download has begun the block numbers will be displayed as they are transmitted. The upload will take approximately 45 minutes to complete.



Chapter 4

Command Summary

Introduction

Overview

This chapter is intended for maintenance personnel.

This chapter provides a description of the commands used for setting up the data communications and for performing diagnostic tests. Refer to Chapter 3. Data Communications Setup

Config address ip *ipaddr*	Set the ANG_DN IP address.
config address ethernet *eaddr*	Set the ANG_DN Ethernet hardware address.
config channel *(A or B)*	Set the ANG_DN channel number.
config device id *xxx.xxx.xxx.xxx*	Set the ANG_DN device id.
config display	Display the current ANCB non-volatile parameters.
config loop	Set the ADH Loop number.
config netmask *xxx.xxx.xxx.xxx*	Set the ANG/DN IP subnetwork mask.
config iproute *routeaddr*	Set the default router IP address.
config time server ip *xxx.xxx.xxx.xxx*	Set the time server IP address.
config unit	Set the ADH Unit number.
date	Display time and date.
date *yyyymmddhhmm*	Set time and date.
display links	Display link state table.
dn setuptime	Display and/or change the DN setuptime in microseconds.
dn window	Display and/or change the DN window.
download	Download new software via Configuration port.
LIST	List next 22 log events.
list nnn	List 22 events, starting with number *nnn*.
list nnn, xxx	List *xxx* events, starting with number *nnn.*
list on	Continuously list events from the log buffer, as they are added (terminate by pressing any key).

Command Summary, Continued

list *clear*	Clear all events from log buffer.
login *password*	Log in to device via Configuration port.
login *password remoteaddr*	Log in to remote device (ANCB or HUB).
logout	Log out of device.
netstat *dn*	Display DataNET link statistics for all ports.
netstat *dn clear*	Display and clear all DataNET link statistics for all ports.
netstat *dn port# clear*	Display and clear DataNET link statistics for the specified port (1 or 2).
netstat *dn port#*	Display DataNET link statistics for the specified port (1 or 2).
netstat *net*	Display network statistics for Ethernet port.
netstat *clear*	Clears the Ethernet statistics counters.
netstat *pna*	Display OS memory buffer statistics.
password *newword newword*	Change login password for ANCB.
port start *port#*	Enable specified DataNET port (2).
port stop *port#*	Disable (stop all activity) on specified Data-NET port (2).
reset	Reset and Save Configuration data.
test *port#*	Put a port into hardware test mode.
test off	Take a port out of test mode.
timeout on	Enable user login timeout.
timeout off	Disable user login timeout.
Validation	Display the current link validation timeout value.
Validation *timeout*	Set a new link validation timeout value.

add adh

This command adds a "local" ADH device to the Address Translation Table. The Address Translation Table translates ADH addresses (Loop & Unit) into IP addresses. "Local" indicates the ADH device is connected directly to the Gateway's ADH data bus.

```
add adh 1 5
```

This command adds ADH device Loop#1, Unit#5 to the Address Translation Table under the IP address of the Gateway.

config address ip

This command sets the device IP address. Each device in the system must have a unique IP address. Your TCP/IP network administrator can help you choose appropriate addresses for your network. IP addresses are entered in "dotted-decimal" notation. For example:

```
config address ip 192.10.6.123
```

The IP address is not automatically stored in non-volatile memory until the reset command is entered. You can display the current IP address with the `config display` command.

config display

This command displays the configuration parameters for the device.

config netmask

This command sets the IP subnet mask for the device. Your TCP/IP network administrator can help you choose appropriate subnet mask for your network. Subnet masks are entered in "dotted-decimal" notation. For example:

```
config netmask 255.255.192.0
```

The subnet mask is not automatically stored in non-volatile memory until the reset command is entered. You can display the current subnet mask with the `config display` command.

config iproute

This command sets the address of the IP router to which the device should send TCP/IP messages whose destinations do not reside on the devices' own network. Your TCP/IP network administrator can help you choose appropriate router addresses for your DataNET hubs (a router address is not required). Addresses are entered in "dotted-decimal" notation. For example:

```
config iproute 192.10.6.1
```

or to disable the router

```
config iproute 0.0.00
```

config time server ip

This command sets the IP address of the device used as a time server. The ANCB date and time is NOT battery backed up and requires resetting each time the power is lost or the board is reset. If a time server is specified the ANCB will request the time at powerup and periodically every 24 hours. The ANCB requests the time from the time server IP on TCP port #13. The returned value must be in the form "Mon Sep 21 13:24:11 1999". A MAXUM analyzer or NAU can be configured to provide the time server function. Addresses are entered in "dotted-decimal" notation. Example:

```
time server ip 127.3.14.12
```

Entering all zeroes for the timer server address will disable the time server function.

```
time server ip 0.0.0.0
```

date

Without an input argument, **date** displays the current date and time, as known by the ANCB. Otherwise, date sets the ANCB's current date and time according to the input argument. The date command has the following form:

```
date yyyymmddhhmm
```

The argument part **yyyy** is the four digits of the year; the first **mm** is the month number; **dd** is the day number in the month; **hh** is the hour number (24 hour system); the second **mm** is the minute number; and .**ss** (optional) specifies seconds.

For example, to set the date to Oct 8, 2001 12:45 AM, type

```
date 200110080045
```

The ANCB clock is not battery backed up. This means the date must be set every time the ANCB is reset or the power is removed. If the ANCB is connected to a network with a timeserver the ANCB can be configured to request the time at power up and every 24 hours thereafter. Refer to the **config timeserver ip** command.

Note

A MAXUM analyzer or NAU can be configured to provide the time server function.

display links

This command displays the ANG_DN link state table. The link state table indicates, for each link, whether or not the link is currently "up," "down," or undergoing link validation ("check"). For DataNET links, the table also gives the device to which the link connects. Devices are identified by IP address. For example:

```
local> display links
Port:    Medium:     Status:       Connected to:
1        ADH Copper  Connected     ADH Channel B
2        DN  Copper  Connected     DN  Channel B
Ethernet             Offline
```

"dn" Command

This command may be used to override default values for several parameters related to the DataNET protocol. Specific forms of the command are:

`dn setuptime`

Displays the current "setup time" value, in microseconds. This is the time that the ANCB_DN board will transmit a "preamble" pattern on a DataNET link before starting the actual data frame. The preamble allows time for the receiver circuitry at the far end of the link to adjust to the incoming signal's amplitude, phase, and frequency. The default setup time is 3.5 milliseconds.

`dn setuptime` *`time`*

Sets the DataNET setup time to the value given, in microseconds. The new setup time value is saved in non-volatile memory.

Time is entered in microseconds. Example: 3.5 milliseconds is entered as 35000.

`dn window`	Displays the transmit "window" size used by DataNET. This is the number of I-frames (Information frame) that a station may send before it must receive a low-level acknowledgment from the receiving station.
`dn window` ***`num`***	Sets the transmit window used by ports 1 and 2 on the ANCB. The parameter "*num*" must be a number 1 through 7. The default window size is 7.

download

Use this command to load new software into the device via the RS-232 Configuration port. The procedure for software download is:

1. Make sure you have a "ANG_DNCP.mot" file available for download.
2. Log into the target ANG_DN board through the RS-232 port, using HyperTerm.
3. Type "download" at the prompt (">"). The device will print some messages and then prompt to begin transmitting the download file.
4. Transmit the download file. Use the HyperTerm "Transfer --> Send Text File…" command. Find the "ANG_DNCP.MOT" file using the browser window. You will have to select "Show all files" in the "Files of type" window to see the "ANG_DNCP.MOT" file.
5. After you have selected the "ANG_DNCP.MOT" file and click on "OK," HyperTerm will begin transmitting records to the Hub. The Hub will respond by periodically displaying addresses as the file downloads.
6. After about 4 minutes 30 seconds, the download will be complete. The hub will then display messages indicating that the download has completed, and it is erasing and programming the FLASH memory.
7. Finally, the Hub will reset, and display a new login prompt.

list

Enter the **list** command at any time from the Configuration Management interface to see event buffer messages. The list command has an internal current sequence number that is set to 1 each time a Configuration Management login occurs. The list command will show 10 messages each time it is entered, beginning with the current sequence number. The current sequence number is updated each time **list** is used. A new current sequence number can be entered with the **list** command:

```
local> list 155
 msg |     source         |   destination     | size | source port |    time stamp
 155 | Trace enabled                                                  | 00:01:48.23
 156 | IP-172.16.9.211   | IP-172.16.9.210   |   64 | 2           | 00:01:48.29
 157 | IP-172.16.9.211   | IP-172.16.9.210   |   64 | 2           | 00:01:49.00
 158 | IP-172.16.9.210   | IP-172.16.9.211   |   64 | Ethernet    | 00:01:49.75
 159 | IP-172.16.9.211   | IP-172.16.9.210   |   64 | 2           | 00:01:50.11
 160 | Station detected IP-172.16.9.014                               | 00:02:00.00
 161 | IP-172.16.9.014   | IP-172.16.9.210   | 1536 | 5           | 00:02:18.29
 162 | IP-172.16.9.211   | IP-172.16.9.210   | 1536 | 2           | 00:02:18.00
 163 | IP-172.16.9.210   | IP-172.16.9.211   | 1132 | Ethernet    | 00:02:19.75
 164 | IP-172.16.9.211   | IP-172.16.9.210   |   64 | 2           | 00:02:20.11
```

The event display gives a time-stamp, and an event description. All events other than frame-capture events are always shown as single lines. Captured frames may be summarized as single lines, or expanded into a multi-line display.

Time stamps are shown as elapsed time from the last board reset or power-on.

The user can view more than 22 messages by supplying a sequence number and list length:

list 1, 300 List message numbers 1 – 300.

The list length may appear by itself:

list , 32

This lists the next 32 trace buffer entries, and increments the current message number by 32.

All the messages in the internal trace buffer can be viewed by listing sequence number one then entering the **list** command until the last message is displayed. When the current message number is incremented to the last message in the internal buffer, it is automatically set to 1.

There is a continuous listing mode for monitoring all the messages in the internal trace buffer. It is set by entering **list on**. All the messages in the internal buffer will be displayed and any new messages will be listed as soon as they are collected into the buffer. The continuous listing mode is terminated by pressing any key.

To clear all events from the event buffer, use

list clear

login

The login command allows the user to access all the ANCB parameters and diagnostic information. The format is:

login password Where password is the user password.

A password can contain any alphanumeric character and must be between 5 and 20 characters in length. See the **password** command for information on how to change the user password.

Users can login to a remote ANCB or DataNET HUB by first logging out of the local device and then typing:

login password xxx.xxx.xxx.xxx Where xxx.xxx.xxx.xxx is the IP address of the remote device.

logout

The logout command is used to log the user out of either the local or remote device. Note: User's will be automatically logged out after five minutes of non-activity unless the user has issued the **timeout off** command. Also the user must be logout of the local device before logging into a remote device. See the login command.

netstat

This command is used to display statistics for the DataNET, Ethernet, or OS memory buffers.

The command **netstat dn** displays the total statistics for all DataNET ports.

The command **netstat dn 1** displays the statistics for DataNET port one only.

Example:

```
local> netstat dn 1
DataNET Statistics for DN link 1
  Frames Sent                    855
  Frames Sent/Retried              0
  Frames Sent/Redirected           0
  Frames Sent w/ Errors            0
  Frames Sent UnACKnowledged       0
  Frames Received                859
  Frames Receiver Not Ready        0
  Frames Received w/ Errors        0
  Link down                        2
```

The command **netstat dn clear** resets all DataNET statistics counters.

The command **netstat dn 2 clear** resets only the port 2 statistics counters.

The command **netstat net** displays the Ethernet statistics for TCP, UDP, and the Ethernet Interface.

```
TCP Statistics
  Segments Received          12
  Segments Sent              12
  Current Connections         0
  Connections Reset           0
  Failed Connections          0
  Segments Retransmitted      0

UDP Statistics
  Datagrams Received        991
  Datagrams Sent            991
  Receive Errors              0
  Unknown Ports               0
```

Interface Statistics	Received	Sent
Bytes	1040	980568
Unicast packets	0	31
Non-unicast packets	10	5
Discards	0	0
Errors	0	0
Unknown protocols	0	

The command **netstat clear** resets the Ethernet statistics counters.

password

The password command is used to change the user assigned password. The password can be any alphanumeric character and it must be between five and twenty characters in length. Example:

password newpassword newpassword

Note the newpassword is entered twice to verify that the password was entered correctly.

"port" Command

This command will enable or disable normal DataNET communication on individual ports. Before placing a port into "test" mode (see test command below), the port must first be taken offline with:

port stop *num*

where *num* is a port number, 1 through 2.

port start *num*

Will re-start normal DataNET communications on a port.

reset

This command resets and saves the configuration parameters in non-volatile memory.

test

This command places a selected port into a hardware diagnostic mode. The test mode can be used to verify cable continuity and DataNET signal levels when used in conjunction with an Oscilloscope or other test device.

The command:

test 1

places port 1 into test mode. The device will generate poll messages on port 1 every 50 milliseconds. The other port continues to operate normally. The command:

test off

turns off test mode. Only one port at a time may be in test mode.

timeout

This command may be used to disable the user login timeout. Normally, if a user has not issued a CLI command for five minutes, the device will automatically shut down the user's login session. This command may be used to defeat (and re-enable) this timeout:

timeout off	Disables timeout. The device will not automatically log out the user, regardless of the time elapsed since the user last issued a CLI command.
timeout on	Re-enables the five-minute CLI timer.

trace

The trace command controls the device's frame tracing function. This feature captures network messages sent and received by the ANCB's event buffer. The trace command controls which messages are captured in the event buffer.

Trace messages may be collected for the Ethernet port or either DataNET port. Trace data may be filtered to collect only input frames, output frames, or data frames (excluding protocol-only frames such as poll/acknowledge). The device will not capture any frames until the "trace on" command is given. Before issuing "trace on," the user can set up trace filtering as described below. By default, tracing is set up for all frames on the Ethernet port.

To set up tracing, the trace command is followed by a list of ***ports*** and a ***filter*** mode. The port list is a comma separated list, which may include any of the following ***ports***:

"**1**" or "**2**"	Specifies DataNET port 1 or 2 Port 1 is DataNET Channel A Port 2 is DataNET Channel B
ethernet	Specifies the Ethernet port

The ***filter*** specification may be one of:

data	Trace all data frames (i.e., exclude frames that do not carry encapsulated Ethernet data).
input	Trace only input data frames.
output	Trace only output data frames
all	Trace all frames, including "protocol-only" frames on DataNET links.

The ***port*** and ***filter*** options may be commanded separately or combined into a single command. The following command sets up tracing for all frames on the Ethernet link:

trace ethernet all

The following command sets up tracing on port 2, Channel B, for input data only.

trace 2 input

The ***filter*** may also specify frames for a specific device by declaring the device IP address. The **device** filter cannot be combined with the **port** specification in a single command. To collect data from or to a device the commands would look like:

trace 1	- Trace port # 1
trace 172.16.9.201	- Show messages from device 172.16.9.201 only
trace on	- Enable tracing

The first command specifies the port #1 for trace data. The second command filters the trace data to a single device's frames, and the third command enables tracing.

Finally, the trace parameters may be reset to their default values (tracing all frames on the Ethernet port, without any address filtering) with:

trace reset

Validation timeout

This command sets the time, in seconds, that the device will wait for the "link validation" diagnostics to complete.

Validation timeout	With no parameters, the command displays the current link validation timeout setting.
Validation timeout 10	Allows 10 seconds for the link diagnostics to complete.

Chapter 5

Troubleshooting

Introduction

Overview

This chapter provides installation personnel with troubleshooting information to solve problems associated in the setup of the Advance Network Gateway.

Chapter Highlights

Before beginning the installation process read through this Chapter to familiarize yourself with the information provides.

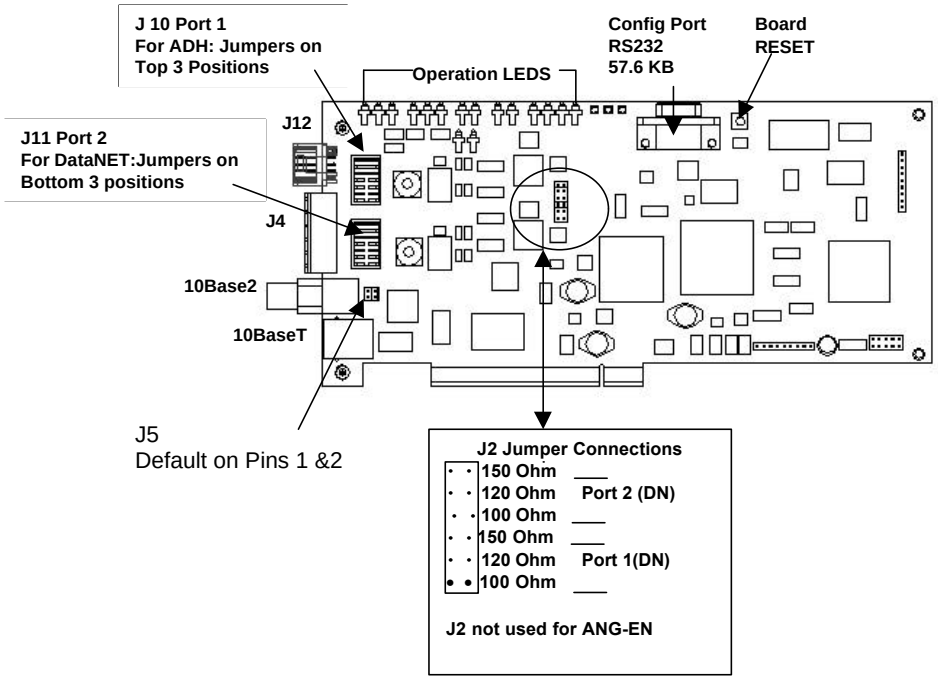
Topic	See Page
ANCB Description	74
ANCB's Leds Description and Operation	76
DataNET Troubleshooting Guide	79
Obtaining Diagnostic Information	82

ANCB Description

Description

The ANCB (Advance Network Communication Board) is the communications electronics for the unit. The ANCB plugs into the PCI slot located on the power supply assembly. A bracket fastens it to the chassis. See Figure 2-4 Power Supply/ANCB Assembly.

Figure 3-1. ANCB Board



J10 &J11 Connections

Jumpers J10 & J11 select the ANG_DN network interface provided to connector J4.

J10 connects Port1 (pins 1-3) on J4 to one of the Optichrom Data Hiway (DH) Channels. or Advance DataNET Channel A interface. J11 connects Port 2 (pins 4-6) on J4 to one of the Advance DataNET Channels.

ANCB Description, Continued

Jumper J2 Settings

Jumper J2 is a six-position header used to select the proper cable impedance matching circuit for each ANCB DataNET port. Jumper J2 is logically partitioned into two groups of three positions, see Figure 3-1. There are two jumpers provided on J2. The lower jumper configures Port1 and the upper configures Port2. Each jumper can be placed in one of three positions, see Figure 3-1. The three positions match cable impedance of 100, 120, and 150 ohms. If the characteristics of the cable you are using are unknown check with the cable manufacturer for the resistance setting. The manufacturer's name is usually printed on the cable cover. The Optichrom Data Hiway cable requires the 150-ohm setting.

Jumper J5 Setting

The ANG/DN consists of two ANCB boards. Each board provides either the A or B channel network interface for one Data Hiway and one DataNET channel. Communications between the two boards is via the Ethernet 10Base2(BNC) port. Jumper J5 selects the termination resistor used for the 10Base2 port. Place the jumper on J5 between pins 1&2. The pins farthest away from the 10Base2 connector (see Figure 3-1). This selects the 50-Ohm termination resistor. The termination resistor provides the proper end point termination resistance so that an external termination resistor is not required.

More Information

See ANCB LEDs Description and Operation, page 76.

ANCB LEDs Description and Operation

Description

This section provides maintenance personnel with information on how to use the ANCB LEDs for troubleshooting the Advance Network Gateway (ANG_DN).

Communications Board LEDs

Refer to Figure 3-2 for LED position and labeling.

Power-UP

At power-up the top row of LED indicators will blink on briefly as the board passes it's various power-up sequence tests. The ADHA green light indicates that the initial program parameters were successfully moved from FLASH to RAM memory. The ADHA yellow LED indicates that the board has passed it's power-up RAM test, the ADHA red LED indicates that the board has passed it's power-up FLASH integrity test, and the ADHB green LED indicates the board has begun it's normal program execution. After approximately 5 seconds the indicators will go off depending upon the current board conditions.

Normal Operation

In normal board operation the ADHA LED's are used to indicate the status of the Data Hiway channel and the DNETB LED's indicate the status of the DataNET channel. In normal operation the ADHA green LED blinks to indicate either transmit or receive activity has occurred on the Data Hiway channel. The yellow LED will blink to indicate any transmit or receive errors that have occurred.

The DNETB LED's provide a link status indication for the DataNET channel. If the DataNET link is up and communicating the DNETB green LED will be lit. If the link is down or in the process of establishing a connection the DNETB red LED will be lit.

The ANG_DN uses the Ethernet 10Base2 port as a cross-link for interboard communications between the two data channels (A&B).

Whenever a communication failure is detected on the cross-link the ADHB yellow and red LED's are ON. If the communication link is working properly the ADHB yellow and red LED's are OFF.

Board Fault Indicators

If the ANG/DN board has a power-up failure or other catastrophic failure during normal operation the red Fault LED will light to indicate that a fault has occurred and the yellow LED will blink an error code, see Table 3-1 Error Codes.

Figure 3-2. ANG_DN LED Indicators

Figure 3-2 shows the edge visible LEDs on the ANCB. The LED labels are silk screened adjacent to each LED on the ANCB.

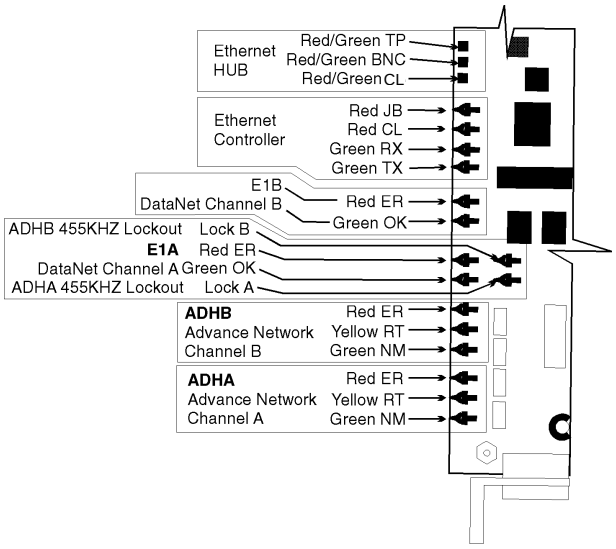


Table 3-1. Error Codes -

Use the following Table 3-1 to determine the error condition. FAULT errors can only be cleared with a board reset.

NUMBER of Blinks	Type of Error	Corrective Action
1	RAM FAILURE	Replace Board
2	FLASH FAILURE	Reload Firmware or Replace Board
3	ETHERNET FAILURE	Replace Board
4	DataNET FAILURE	Replace Board
6	DUPLICATE IP	Change Board IP address
8	WRONG LOOP	Change Loop Number
9	WRONG JUMPER CONFIGURATION	Check J10 and J11 Connections
10	DUPLICATE UNIT NUMBER	Change Unit Number
11	INVALID or INCORRECT CONFIGURATION	Verify and Edit the Configuration parameters for ANG_DN

ANCB Ethernet Controller LEDs

Each ANCB provides two Ethernet ports a 10BaseT and 10Base2. Each port is connected directly to an onboard Ethernet hub. The three LED's labeled HUB in figure 3-2 (CL, BNC,TP) are the status indicators for this internal hub. The Hub LED's are bi-colored LED's and require careful observation of both the color and blink rate to determine the device status. Table 3-1 describes the color and blink rate to determine device and port status.

The on-board Ethernet controller provides four status LED's in Figure 3-2. (Tx, Rx, CL, JAB) The Green TX LED blinks whenever a message is transmitted on the Ethernet channel. The Green RX LED blinks whenever a message is received on the Ethernet channel. The Red CL LED indicates there was a collision on the Ethernet. Note: collisions are a normal occurrence on an Ethernet network. However, excessive collision's can be indication of a potential problem on the Ethernet. The Red JAB LED indicates that the Ethernet controller has determined that the transmitter has remained on for longer than allowed and indicates a possible hardware failure.

10BaseT/10Base2 Ethernet LED

CL Steady Green indicates a FIFO error
Steady Red indicates a Collision on the HUB ports (Receiving on one port while transmitting another)

BNC Blinking Red indicates a packet is being transmitted.
Blinking Green indicates a packet is being received.
Alternating Red/Green indicates the 10Base2 port is Partitioned Out (Disabled).

TP Steady Green indicates the 10BaseT port is receiving the Link Integrity Pulse (Keep Alive signal)
Blinking Red indicates a packet is being transmitted.
Blinking Green indicates a packet is being received.
Steady Red indicates the Polarity is reversed on the 10BaseT port.
Alternating Red/Green indicates the 10BaseT port is Partitioned Out (Disabled).

DataNET Troubleshooting Guide

Instructions

If an ANG-DN and a DataNET Hub fail to establish a link, this may be due to one of two situations:

- a configuration conflict,
- a link signal quality problem.

Configuration Conflicts

If after connecting an ANG_DN port the DNETB Green LED never comes on, or intermittently flashes between green and red, there may be a configuration conflict. Configuration conflicts can be caused by cabling or improper software configuration parameters.

Cable Connected to Wrong Hub or Port

Verify that the Channel A DataNET link is connected to the A Hub half and that the Channel B DataNET link is connected to the B Hub half. Verify that both Channels A & B utilize the same port number on their respective Hub half. Then display the Port Status screen by connecting a PC to the Configuration Port, logging in, and typing ***display links***. Verify that the two Ports are connected as expected.

Example

The following example shows that port #1 (ANG_DN Channel A board) is connected to the ADH Channel. Port#2 (ANG_DN Channel A board) is also connected to the DataNET Channel A Hub. Note that the Ethernet cross-link status is Online.

```
local> display links
Port:   Medium:      Status:          Connected to:
1       ADH Copper   Connected        ADH Channel A
2       DN   Copper  Connected        DN  Channel A
Ethernet             Online
```

Cable Impedance Matching

Improper cable impedance matching. Verify that the impedance jumpers located on J2 are set to match the attached cable impedance. The available selections are for 100, 120, and 150 Ohms.

Cable Shielding

Cable Shielding problems. Make sure the cable is of the recommended type and that the twisted-pair shield is grounded at one end only. (Hub end recommended.)

Configuration Parameter Errors

Verify the configuration parameters by connecting a PC serial port to the ANG_DN Configuration Port, logging in, and typing ***config display***.

```
local> config display
  Config:
    device              ANG_DN
    address ip          161.218.54.56
    netmask             255.255.255.0
    iproute             0.0.0.0
    time server ip      0.0.0.0
    address ethernet 00.c0.c9.00.d2.3b
    device id           161.218.54.55
    channel             B
    loop                1
    unit                0
    port1               Advance Data Hiway
    port2               DataNet Copper
```

More Checks

Verify the following:

1. That each ANG_DN board (ANCB) has a unique IP address.
2. That each ANG_DN board (ANCB) uses the same netmask.
3. That the iproute is either not used (0.0.0.0) or points to the address of your network default router (see your network administrator).
4. That the device id is unique per DataNET device and the same for both ANCB boards. The Device ID is the DataNET address of the ANG_DN itself. Therefore both sides must use the same address. Typically the Device ID is set to the same address as the Channel A IP address.
5. The channel entry must be unique to each ANG_DN board (ANCB) and must be either a or b.
6. The DH Loop must be the same on both ANG_DN boards (ANCB) and the allowable range is Loop # (1-8).
7. The DH Unit must be the same on both ANG_DN boards (ANCB). The allowable ANG_DN unit range is Unit # (0-31).

Signal Quality Problems

If the ANG_DN port LED never goes to green, or intermittently flashes between green and red, there may be a signal quality problem. Signal levels should be examined to determine if a particular port has a signal too large or too small relative to the other ports on the HUB. If a link fails to connect at all, place the port in a test mode which will cause activity to occur every ~50 milliseconds instead of every ~5 seconds as on an un-connected link.

Placing Unit in Test Mode

To place the unit in a test mode use the CLI commands to take the link offline (port stop *n*) and initiate the test mode (test n). At this time, an oscilloscope may be taken to the site of the slave device and connected to monitor the signal. The signal received at the slave should be between ~0.75 v p-p and 5 v p-p. A signal smaller than ~0.75 v p-p is generally not adequate. The impedance matching jumpers can be changed to correct some signal level issues.

If the condition of excessive signal loss can not be corrected by jumper settings, it may indicate inadequate cable properties (i.e. too long or wrong type of cable).

The port can be taken off test mode and put back to normal operation with the “test off” and “port start *n*” commands.

Obtaining Diagnostics Information

Description

You can access the following Diagnostic information from an Advance Network Gateway (ANG_DN).

- ADH Channels Status
- Error Log

Before You Begin

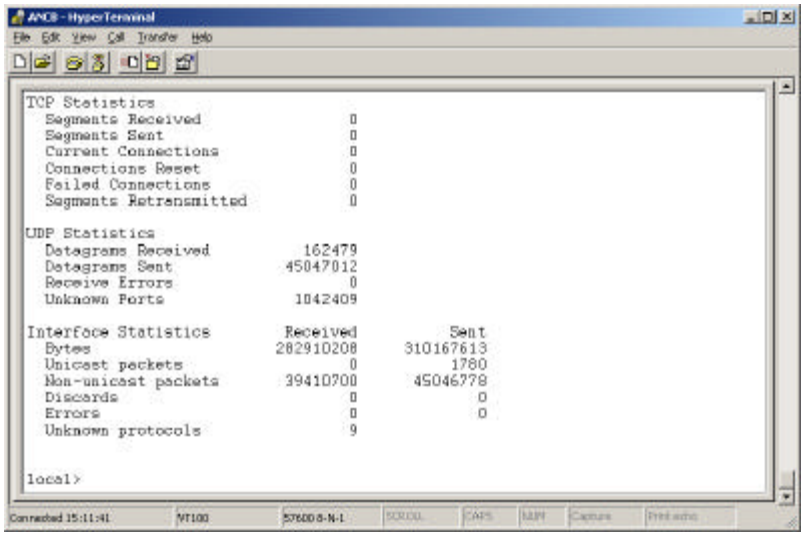
The following procedure assumes that the Windows Hyper Terminal program residing on your PC has been configured, the ANG_DN is operational, the PC is connected to the ANG_DN and you have logged on.

Ethernet Network Information

To display current Ethernet network diagnostic information:

1. Log on to the ANG_DN.
2. At the **>** prompt type: ***netstat net***

   The UDP and Interface Statistics screen will appear. The display shows the number of packets received and transmitted and the number of errors detected.

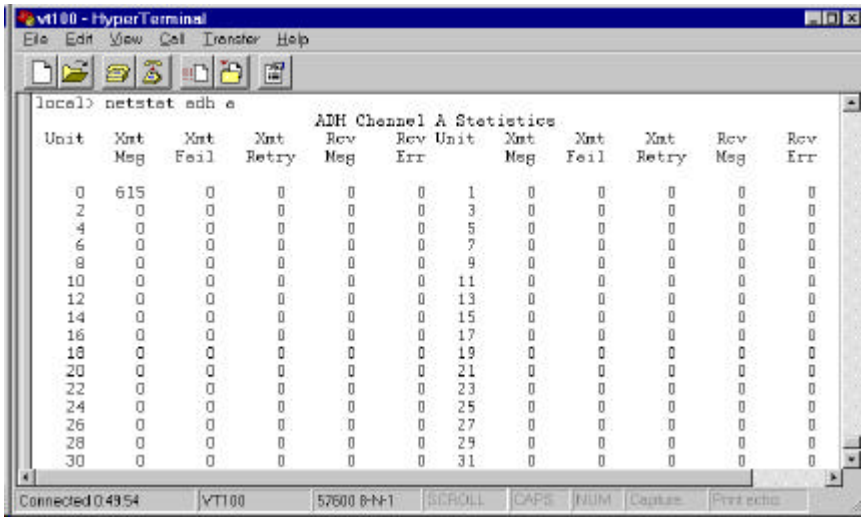


ADH Channel Information

To display the current diagnostic information for the ADH channels:

1. Log on to the ANG_DN.
2. At the **>** prompt type: ***netstat adh (a or b)***.

   The display shows the number of packets received, transmitted and the number of errors detected for each of the 31 units on the assigned loop.

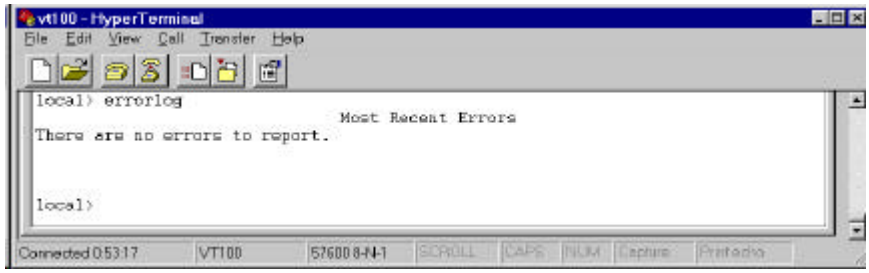


Error Log

To display an error log specific to each ANG_DN:

1. Log on to the ANG_DN.
2. At the **>** prompt type: ***errorlog***

   The Most Recent Error log screen appears.



Chapter 6

Parts Catalog

Introduction

Overview

This chapter is intended for maintenance personnel.

The Chapter provides a list of replaceable parts and assemblies for the Advance Network Gateway with DataNET option. Subsequent information includes how to remove and replace the replacement part or assemblies.

How to Place an Order

Parts can be ordered from:

Siemens Applied Automation
Customer Service Order Entry
500 West Highway 60
Bartlesville, Oklahoma 74003
Inside Oklahoma: 918-662-7370
Outside Oklahoma: 800-448-8224 (toll free)
Internationally: 001-918-662-7370

To ensure an immediate response to your request, you should provide the following:

- Purchase order number. If ordering by phone, a confirming P.O. should be sent.
- Address where the parts are to be shipped.
- Address where the invoice is to be sent.
- Siemens Applied Automation part numbers as listed.
- Quantity needed of each part.
- Equipment Serial number or project number of the system (especially for warranty related orders).
- Preferred method of shipment.

Available Parts

Description

The available Advance Network Gateway with DataNET spare parts and applicable part numbers are shown below.

Part Description	Ordering Number
Power Supply, Base Assembly	2015849-802
ANCB Communication Board; Ethernet to Data Hiway Gateway	2020951-805
Debug Port Extension Cable	2020914-001
Power Supply to Circuit Board Cable	2020276-001
Advance Data Hiway Connector	1221007-014
AC Power Connector	1222010-017
Module to Module Interconnect Cable	1681011-014
Fiber Optics Coupler Assembly	2015828-801
Fiber Optics Coupler Seal Nut	N8005
Fiber Optics Coupler Cable	2020947-001

Appendix

Data Hiway Testing

How to Test the Data Hiway

Post Installation Test

The following test procedure tests the Channel A and Channel B Data Hiway cable connections. These test procedures insures that the signal lines are correctly installed.

Referenced testing points are CH A and CH B (+) and negative (-) and shield ground termination's.

Test Equipment

The following test equipment is required to test continuity of installed Data Hiway Channel A and Channel B signal lines:

- 9 Vdc battery, with connector leads and clips
- Digital Volt Ohm Meter (DVM) or equivalent
- 10K ohm resistor, with leads and clips

Measuring Signal Line Continuity

Data Hiway channel A and channel B + and - signal line continuity can be checked by performing the following procedures. Devices can be operating on the Data Hiway when making continuity checks. Perform the check for each device connected to the Data Hiway.

Do not skip testing any devices connected to the Data Hiway. Check at the incoming termination's on the I/O chassis, the Termination Boards in the Analyzer Electronics enclosures, LINC units, and any other Data Hiway devices. Typical problems are reverse polarity; poor contacts on wiring terminals, opens, and shorts and cross channel wiring. Every point in the Data Hiway wiring should be carefully checked to ensure correct wiring.

Step	Procedure
1.	Connect the positive lead of the 9-volt battery through the 10K ohm resistor to Channel A (+) terminal and connect the negative lead of the battery to the Channel A (-) terminal at any connection point on the Data Hiway.
2.	Using DVM measure for 9.0 Vdc across Channel A (+) and Channel A (-).
3.	Repeat steps 1 and 2 for Channel B.

Measuring Shield Continuity

Data Hiway shield lead continuity can be checked by performing the following procedures:

Ground Data Hiway cable shields at only one end of each segment. This practice reduces ground loop noise.

Step	Procedure
1.	With Data Hiway communicating with connected Nodes, temporarily disconnect Channel A shield lead from ground.
2.	Connect 10K ohm resistor to disconnected shield and connect battery positive (+) lead to resistor. Resistor should be in series with the battery. Connect battery negative (-) lead to unit ground.
3.	Connect DVM positive (+) lead to channel A and connect shield and negative (-) to unit ground. Measured voltage potential should be 9 Vdc.
4.	If 9 Vdc is not measured, the channel A shield line is grounded at another point; correct problem.
5.	Reconnect channel A and shield lead.
6.	Repeat steps 1 through 5 for Channel B.
7.	Repeat steps 1 through 6 for each shield ground point on the Data Hiway cable.

Glossary

Definitions

Overview

This section defines important Terms.

Advance Network Gateway Ethernet

The Advance Network Gateway Ethernet (ANG_EN) is a wall- (or rack-) mounted unit that is self-contained with power supply and all electronics. It provides internal field termination points to connect standard Advance Data Hiway cable “on one side” and Ethernet 10BaseT cabling (Unshielded Twisted Pair) “on the other side”. The Gateway unit requires 120 VAC power wired directly to it.

Ethernet

A data link level protocol comprising the OSI model’s bottom two layers. It is a broadcast networking technology that can use several different physical media, including twisted-pair cable and coaxial cable. Ethernet usually used CSMA/CD. TCP/IP is commonly used with Ethernet networks.

Collisions

The result of two or more LAN stations attempting to use the same transmission medium at the same time. Collisions are a normal occurrence on Ethernet. A properly functioning Ethernet will experience a relative small percentage of collisions. Typically the collision rate should be less than 5% of the available bandwidth. Most collisions occur during the preamble portion of the frame. Most Ethernet controllers automatically retry, up to 15 times, any packet that has a collision during transmission. (Except for Late Collisions)

CRC - Cyclic Redundancy Check

CRC is a method to detect errors. A number is derived from the data that will be transmitted. By recalculating the CRC at the remote end and comparing it to the value originally transmitted, the receiving node can detect errors.

DataNET

The name “DataNET” is used by Siemens Applied Automation to mean the high-speed communication system inclusive of our application software.

Data Hiway

The term “Data Hiway” refers to the Advance Optichrom Network. The Advance Network Gateway and DataNET Gateway are used to bridge the Advance Optichrom network and the Advance DataNET network.

Late Collision	A Late Collision is one that occurs after the first 64 bytes in a frame or packet. Since the smallest Ethernet frame (packet) is 64 bytes in length, late collisions will not be detected on small packets. Ethernet controllers do not retransmit packets with late collisions resulting in lost packets. Late Collisions usually appear as a bad FCS frame. The only time a late collision can be detected on a 10BaseT network is when the detecting device is transmitting at the same time.
FCS - Frame Check Sequence Error	The CRC (Cycle Redundancy Check) remainder transmitted at the end of a frame. A FCS error is a legal sized Ethernet frame with a bad frame check sequence.
Ghosts	Ghosts are energy on the cable that appears to be a frame, but does not have a valid beginning of frame pattern (start delimiter 10101011). Ground loops and other wiring problems cause some repeaters to believe that a frame is being received. Since the repeater is only reacting to an AC voltage riding on the cable, there is not a valid frame to pass along. The repeater, however, transmits this energy along the network. This may be a jam pattern or a very long preamble. Ghosts events consume bandwidth and can slow down a network. Ghosts are the result of network elements reacting to noise. The effect of noise on network wiring is indeterminate. Some network devices will react while others will not. Ghosts cause random events and can be hard to correct.
Jabber	The term Jabber refers to an Ethernet frame that is greater than the maximum legal size (Greater than 1518 bytes). Many 10BaseT HUBS will partition a port that is jabbering.

SIEMENS

Siemens Applied Automation
500 West Highway 60, Bartlesville, OK 74003
Phone 918-662-7000, Fax 918-662-7052